NUEXCO

Monthly Report

July 1990 **Number 263**

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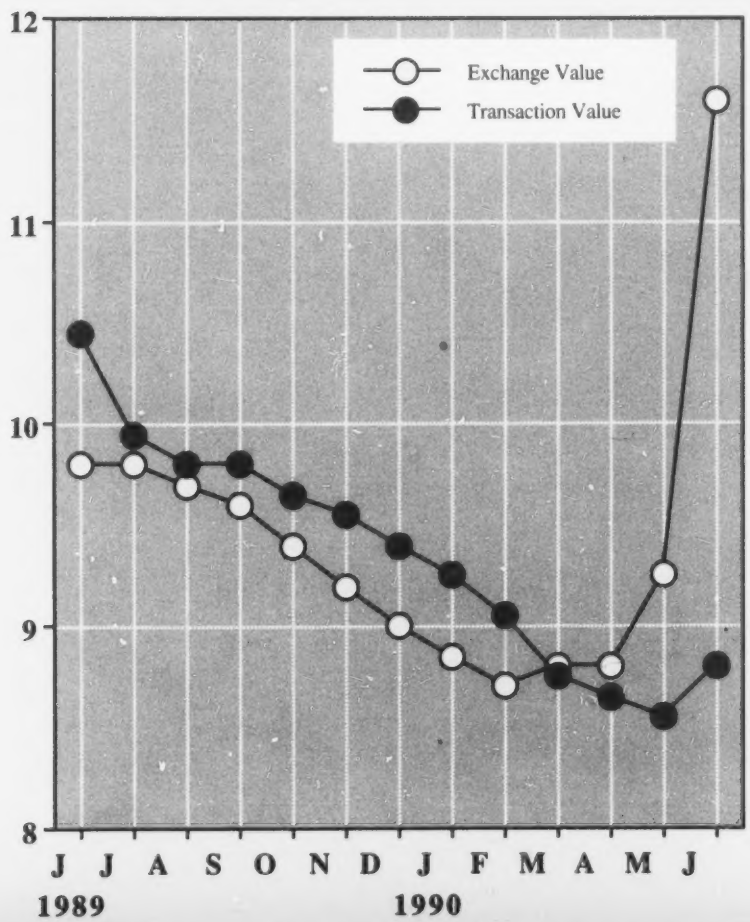

NUEXCO

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- **First Half 1990 Market Review** 20

Within the first six months of 1990, the near-term uranium market has seen a 33-percent rise in the Exchange Value, a 31-percent increase in the UF_6 Value, and sales of almost 23 million pounds equivalent U_3O_8 NUEXCO examines some of the factors that contributed to this rapid price rise and record-high market volume.

- **World Uranium Requirements** 22

Through the year 2005, NUEXCO projects the cumulative world uranium requirements to exceed 2.2 billion pounds equivalent U_3O_8 or an average of 138 million pounds per year. The expect growth rate is 1.4 percent per year through 2000. Requirements from the USA and Europe will grow more slowly than from the Far East and other countries, but four countries (the USA, France, Japan, and West Germany) still will account for 75 percent of the total.

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To Our Readers

Please note that, as of this issue, we have made improvements to the *Supply and Demand* tables in the Market Review section. Loan supply and demand are now included as subsections within the uranium supply and uranium demand tables, respectively. A second improvement affects all four supply and demand tables. Active supply and demand items are still listed individually, but inactive supply and demand, also previously listed by item, are now presented as aggregate totals.

* * *

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MARKET VALUES SUMMARY

June 30, 1990

NUEXCO Market Values	This Report June 30, 1990	Last Report May 31, 1990	12 Months Ago June 30, 1989
EXCHANGE VALUE [1]	**$11.60**/lb equivalent U_3O_8	$9.25	$9.80
UF_6 VALUE [2]	**$32.00**/kg U as UF_6	$25.50	$30.25
LOAN RATE [3]	**3.5%**/annum	3.5%	3.5%
CONVERSION VALUE [4]	**$1.45**/lb U as UF_6	$1.45	$1.95
SWU VALUE [5] **(0.3 tails assay)**	**$50**/SWU	$50	$66
TRANSACTION VALUE [6]	**$8.80**/lb equivalent U_3O_8	$8.55	$10.45
Transactions	**38**	27	27
Months	**3**	3	3
Millions of Pounds	**11.3**	9.9	5.5

DEFINITIONS

[1] The **Exchange Value** is NUEXCO's judgment of the price at which transactions for significant quantities of natural uranium concentrates could be concluded as of the date indicated.

[2] The **UF_6 Value** is NUEXCO's judgment of the price at which spot and near-term transactions for significant quantities of natural uranium hexafluoride could be concluded as of the date indicated.

[3] The **Loan Rate** is NUEXCO's judgment of the annual interest rate at which uranium loans could be concluded as of the date indicated.

[4] The **Conversion Value** is NUEXCO's judgment of the price at which spot and near-term transactions for significant quantities of conversion services could be concluded in the secondary market as of the date indicated.

[5] The **SWU Value** is NUEXCO's judgment of the price at which spot and near-term transactions for significant quantities of enrichment services could be concluded as of the date indicated.

[6] The **Transaction Value** is a weighted average price of recent natural uranium sales transactions. The calculation is based on prices paid in:

a. Transactions closed within the previous three month period for which delivery is scheduled within one year of the transaction date;
b. At least ten transactions;
c. Transactions involving a sum total of at least 2 million pounds equivalent U_3O_8.

DERIVATIONS AND COMMENTS

- All **Market Values** are expressed in terms of US$.
- All **Market Values** are based on:
  - Data from recently completed transactions.
  - Data from pending transactions.
  - Firm bids to buy or borrow, and firm offers to sell or lend.
  - Prices purchasers or rates borrowers have expressed a willingness to pay, but for which NUEXCO is not aware of firm bids to buy or borrow and prices sellers or rates lenders have expressed a willingness to accept, but for which NUEXCO is not aware of firm offers to sell or lend.
- Prices associated with deliveries under old or renegotiated contracts or other than arm's-length transactions are not included in the determination of these **Market Values**.
- In the determination of prices, NUEXCO does not consider charges for transportation other than that customarily provided by suppliers.
- The prices of services or materials delivered under long-term contracts with primary suppliers are not considered in the determination of the listed values.
- For the **SWU Value**, NUEXCO converts SWU prices at varying tails and product assays to equivalent SWU prices at a tails assay of 0.30 weight percent U^{235} and a product assay of 3.0 weight-percent U^{235}, assuming feed costs corresponding to the NUEXCO **Exchange Value** and **Conversion Value** determined as of the same date.
- In calculating the **Transaction Value**, NUEXCO does not account for the price of uranium delivered in connection with contracts which call for "market price" mechanisms. This exclusion applies particularly to contracts in which delivery prices are expressed as a function of future **Exchange Values** or any other indeterminate variable. Also excluded from the calculation are any other transactions in which the delivery price is defined in such a way that it can not currently be determined.
- The sample time for the **Transaction Value** is extended as necessary to satisfy the minima for the number of transactions and quantity of material. Other currencies are converted to US dollars using conversion rates in effect on or near the transaction date.

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MARKET REVIEW

JUNE MARKET REVIEW

(as of June 30, 1990)

OVERVIEW

Price levels and trading volume in the natural uranium market increased rapidly all month, accelerating upward during the second half of June. The June 30 Exchange Value and the UF_6 Value each rose a record 25 percent from their May 31 levels, to $11.60 per pound U_3O_8 and $32.00 per KgU as UF_6, respectively. In the uranium market, transactions totalled over eight million pounds in 25 sales. Almost four million pounds equivalent U_3O_8 changed hands in twenty-two near-term sales. Twelve involved concentrates, nine UF_6, and one involved enriched uranium product (EUP). The June transactions bring the half-year total of near-term market activity to 69 sales involving nearly 23 million pounds equivalent U_3O_8 (**Table 1**). The article on page 20 of this issue reviews market activity for the first half of 1990. In addition, three long-term sales concluded in June totalled over four million pounds equivalent U_3O_8 for delivery through 2001.

The Loan Rate, Conversion Value, and SWU Value all remained unchanged from their May 31 levels. One June loan for concentrates is reported. Utilities made four secondary market conversion purchases.

The SWU market was quite active, as seven SWU sales totalled over 850 thousand SWU. Three near-term SWU sales totalled over 100 thousand SWU; the remaining sales were long-term SWU contracts for delivery during the period 1991-1993.

Table 1
SPOT URANIUM SALES SUMMARY

	June 1990		Year-to-Date	
	No. of Sales	Volume[1]	No. of Sales	Volume[1]
Concentrates	12	2.2	35	9.0
UF_6	9	1.4	25	9.4
EUP	1	0.3	9	4.2
Total	**22**	**3.9**	**69**	**22.6**

[1] Million Pounds Equivalent U_3O_8

NATURAL URANIUM AND CONVERSION

Short-term Market Activity

The **Exchange Value's** June 30 rise of $2.35, to **$11.60** per pound U_3O_8, represents a 25-percent increase, the largest in its twenty-two year history. Due to the market's rapid rise, sales closed at successively higher prices throughout June. The month began with a high degree of uncertainty in the market; buyers and sellers were unsure if the market had bottomed, and if so, whether the five percent rise of May 31 signalled a turnaround. The pace at which prices rose during the month, particularly after years of gradual, steady decline, took many market participants by surprise, and resulted in further uncertainty. Due to the rate of the price increases, offers often lagged current price levels only days after they were issued, making it difficult for market participants to accurately assess current market levels. The market was primarily driven by activity in North America, as the market in Europe was relatively quiet in comparison.

Twelve June concentrates sales involved over two million pounds equivalent U_3O_8. Producers made most of the purchases, but three utilities also bought material. Four US utilities are evaluating offers as well. Producers remain very active as buyers in the spot concentrates market, filling contract requirements and making discretionary purchases. However, as prices approach higher levels, some producers may resume uranium production and revert to their traditional roles as sellers in the market. If so, significant changes in the supply and demand balance could result.

The number of near-term uranium sales so far this year totals 69. If this pace continues through the end of the year, it would establish a new annual record for number of spot uranium transactions. One reason for the large number of transactions may be, that while an oversupply of uranium still exists, fewer suppliers are selling large quantities in the near term. Therefore, buyers purchasing a substantial quantity for short-term delivery are sometimes unable to find the whole quantity in a single offer. Buyers then contract with several suppliers to achieve the desired

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purchase quantity, or spread purchases over a longer period of time. Either result increases the number of sale transactions and may reduce their average size. Thus, for example, instead of one purchase for 500 thousand pounds U_3O_8, a buyer may make three purchases for a *total* of 500 thousand pounds.

* * *

The **UF_6 Value** jumped to **$32.00** per KgU as UF_6 on June 30. This $6.50 increase is the largest increase, both in absolute terms and as a percentage, in the five-year history of the UF_6 Value. Nine near-term UF_6 sales totalling 1.4 million pounds equivalent U_3O_8 took place in June. Market activity in North America predominated in the UF_6 market as well; eight of the nine buyers were North American, as were at least five of the nine sellers. Six utilities purchased UF_6 during June. Price levels in the natural UF_6 market behaved similarly to the concentrates market, increasing steadily throughout the month. The oversupply of UF_6 (particularly in Europe) that has loomed over the market for much of the year and exerted downward pressure on prices has dissipated. Thus the concentrates and UF_6 markets are responding faster to temporary changes in supply and demand than in past months.

Table 2
NEAR-TERM SUPPLY/DEMAND SUMMARY

	Active Supply [1]	Active Demand [1]
• Natural Uranium [2] (thousand lbs equivalent U_3O_8)	5,175	3,470
• Supply/Demand Ratio:	1.5	
• Loans (thousand lbs equivalent U_3O_8)	7,210	0
• Conversion (thousand lbs U as UF_6)	0	670
• SWU (thousand SWUs)	435	15

[1] Supply and demand tables in the current market data section of this Report provide details for each category.
[2] Includes concentrates and hexafluoride.

The **Transaction Value** increased $0.25 this month to **$8.80** per pound U_3O_8 based on 38 transactions over 3 months involving 11.3 million pounds. By definition, the weighted, moving average used to calculate the Transaction Value is slow to respond to market changes. This is the first upward movement of the Transaction Value since September 1987.

* * *

Active uranium supply increased to **5.2** million pounds equivalent U_3O_8, while **active uranium demand** declined slightly to **3.5** million pounds equivalent U_3O_8 (**Table 2**). The **supply/demand ratio** climbed to **1.5**, marking the first time in three months that supply has exceeded demand. Additional supply can be expected to emerge in response to the higher prices prevailing in the current market.

Many buyers and sellers evaluate loan material and sale material as virtually equivalent when estimating the supply available to fill near-term demand. While loans only defer demand rather than fill it, the term for loan repayment effectively changes the supply/demand situation in today's very active market. Reflecting that widely-held perception, NUEXCO has revised the format of the supply and demand listings found on pages 7-8. Active supply and demand items are still listed individually, but inactive supply and demand are now listed only as aggregate totals.

* * *

Long-Term Natural Uranium Market Activity

Three long-term natural uranium sales totalling over four million pounds equivalent U_3O_8 are reported this month. Three European utilities purchased material for delivery during 1991 to 2001. Two sales involved concentrates, the other involved UF_6.

* * *

The **Loan Rate** remains at **3.5** percent per annum. The one loan reported this month, in which an intermediary borrowed from a producer, took place near the prevailing Loan Rate. Loan supply remains plentiful.

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MARKET REVIEW

The **Conversion Value** remains at **$1.45** per pound U as UF_6. The four June sales, all with US utilities as buyers, totalled over 800 thousand pounds U as UF_6. The easing of the UF_6 supply glut, and the recent price jumps of the Exchange Value and UF_6 Value, have reduced some of the downward pressure on the Conversion Value. Although UF_6 is still selling at a discount compared to the sum of its components—concentrates and conversion—the discount has decreased recently as the concentrates and the UF_6 markets have tended to behave more consistently with one another.

ENRICHMENT SERVICES AND ENRICHED URANIUM PRODUCT

The **SWU Value** remains unchanged at **$50** per SWU, marking the fifth consecutive month at that level. However, unlike recent months when only limited activity occurred in the SWU market, intermediaries sold 850 thousand SWU in seven different sales during June. Three sales totaled over 100 thousand SWU for near-term delivery; the remaining four sales involved nearly 750 thousand SWU for medium-term delivery to utilities during the period 1991-1993. Active SWU supply continues to exceed active SWU demand.

One sale of EUP is also reported this month. A utility purchased over 300 thousand pounds equivalent U_3O_8 from an intermediary for delivery in 1991. ■

Table 3
ENRICHMENT PRICES
(June 30, 1990)

Prices	This Month Report 263	Last Month Report 262	12 Months Ago Report 251
NUEXCO SWU Value ($US per SWU)	50	50	66
US DOE SWU prices: ($US per SWU)			
USEC	117.85[1]	117.85[1]	117.00[2]
AFC	153.00[3]	153.00[3]	153.00[3]
Requirements	157.00[3]	157.00[3]	157.00[3]
Incentive Price (IP1)	90.00[4]	90.00[4]	90.00[4]
Calculated worth of enriched UF_6[5]: ($US per KgU as UF_6)			
2.5 w/o U_{235}	306	274	328
3.0 w/o U_{235}	391	351	422
3.5 w/o U_{235}	478	430	519
4.0 w/o U_{235}	565	510	617

[1] Effective 10/1/89 to 9/30/90.
[2] Effective 10/1/87 to 9/30/89.
[3] Effective since 10/1/84.
[4] Effective 10/1/86 to 9/30/90, for up to 30% of annual requirements.
[5] Calculated using the NUEXCO Exchange Value, Conversion Value, SWU Value and 0.30 w/o tails assay.

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RECENT TRANSACTIONS

URANIUM SALES[1]

NUEXCO Transaction Number	Delivery Period	Approximate Quantity (thousand pounds equivalent U_3O_8)	Approximate Price Range[2] as Percent of Current Exchange Value or UF_6 Value	Buyer	Seller	Remarks
4858	1991	301-600	78-82	Utility	Intermediary	UF_6
4859	1990	Less Than 50	R[3]	Intermediary	R[3]	UF_6
4860	1990	50-100	83-87	Producer	Intermediary	
4861	1990	50-100	83-87	Producer	Intermediary	
4862	1990	101-300	83-87	Utility	Intermediary	UF_6
4864	1990	101-300	83-87	Producer	Intermediary	
4865	1990	301-600	78-82	Producer	Intermediary	
4866	1990	101-300	88-92	Producer	Intermediary	
4867	1990	101-300	88-92	Producer	Intermediary	
4870	1990	101-300	R[3]	R[3]	R[3]	UF_6
4871	1990	50-100	88-92	R[3]	Producer	
4872	1990	101-300	93-97	Producer	Intermediary	
4873	1990	101-300	93-97	Producer	Intermediary	UF_6
4874A	1991	301-600	See Remarks	Utility	Intermediary	Contained in EUP
4875	1990	50-100	93-97	Producer	Producer	
4876	1991	101-300	88-92	Utility	Intermediary	UF_6
4882	1992-2001	1,001-3,000	R[3]	Utility	R[3]	
4887	1992	101-300	R[3]	Utility	Intermediary	UF_6
4888	1991-2000	1,001-3,000	See Remarks	Utility	Producer	Base Price Escalated
4889	1990	Less Than 50	88-92	Utility	Intermediary	UF_6
4891	1990	101-300	83-87	Utility	Intermediary	UF_6
4892	1991	101-300	83-87	Utility	Intermediary	UF_6
4893	1990	50-100	R[3]	Utility	Producer	
4894	1991	101-300	R[3]	Utility	Producer	
4895	1991	101-300	R[3]	Utility	Producer	

[1] Transactions listed are not limited to those in which NUEXCO was involved, but also include others of which NUEXCO is aware. NUEXCO may delay reporting some transactions in order to protect proprietary information.
[2] The range reflects five percentage points (inclusive) per grouping, centered about the middle of the range.
[3] The notation **R** means that NUEXCO either does not know, or that NUEXCO has restricted that information to protect client or source confidentiality.

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MARKET REVIEW

LOAN TRANSACTIONS[1]

NUEXCO Transaction Number	Delivery Period	Approximate Quantity (thousand pounds equivalent U_3O_8)	Approximate Price Range[2] as Percent of Current Loan Rate	Borrower	Lender	Remarks
4868	1990	101-300	98-102	Intermediary	Producer	

CONVERSION SERVICES SPOT MARKET SALES[1]

NUEXCO Transaction Number	Delivery Period	Approximate Quantity (thousand pounds U as UF_6)	Approximate Price Range[2] as Percent of Current Conversion Value	Buyer	Seller	Remarks
4863	1991	101-300	98-102	Utility	R[3]	
4877	1990	301-600	83-87	Utility	Intermediary	
4896	1991	101-300	103-107	Utility	Converter	
4897	1991	101-300	108-112	Utility	Converter	

ENRICHMENT SERVICES SECONDARY MARKET SALES[1]

NUEXCO Transaction Number	Delivery Period	Approximate Quantity[4] (thousand SWUs)	Approximate Price Range[2] as Percent of Current SWU Value[5]	Buyer	Seller	Remarks
4874B	1991	50-100	See Remarks	Utility	Intermediary	Contained in EUP
4878	1991-1993	101-300	See Remarks	Utility	Intermediary	Base Price Escalated
4879	1991-1993	101-300	See Remarks	Utility	Intermediary	Base Price Escalated
4880	1991-1993	50-100	See Remarks	Utility	Intermediary	Base Price Escalated
4881	1990	Less Than 50	98-102	Intermediary	Intermediary	
4886	1991-1993	101-300	See Remarks	Utility	Intermediary	Base Price Escalated
4890	1990	Less Than 50	108-112	Utility	Intermediary	

1 Transactions listed are not limited to those in which NUEXCO was involved, but also include others of which NUEXCO is aware. NUEXCO may delay reporting some transactions in order to protect proprietary information.

2 The range reflects five percentage points (inclusive) per grouping, centered about the middle of the range.

3 The notation **R** means that NUEXCO either does not know, or that NUEXCO has restricted that information to protect client or source confidentiality.

4 If tails assay is unknown or unspecified, NUEXCO's calculation of SWU quantity assumes 0.30 w/o tails assay.

5 Prices are usually normalized to 0.30 w/o tails assay. When prices and SWU values are expressed as discounts from a reference price (e.g., X dollars less than DOE's USEC base price at time of delivery), the percentage price range is based on the discounted prices, not on the reference price.

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SUPPLY AND DEMAND

Uranium Supply

(June 30, 1990)

NUEXCO Project Number	Quantity (Thousand Pounds equivalent U_3O_8) Spot or Near-term [1]	Intermediate or Long-term [2]	Delivery Period	Remarks
Available for Sale				
ACTIVE				
90-1078A	2,175	2,175 per year	1991-1993	UF_6e
90-7001*	3,000	3,000 per year	1991-1995	
Total	**5,175**			
INACTIVE	**1,700**			
Available for Loan				
ACTIVE				
88-1182	4,000	--	--	U_3O_8/UF_6
90-1016	300	--	--	U_3O_8
90-1033	1,270	--	--	UF_6
90-1108	1,000	--	--	U_3O_8
90-1110	250	--	--	U_3O_8
90-1115	390	--		UF_6
Total	**7,210**			
INACTIVE	**2,000**			

* New or revised since last month.

[1] For delivery within one year, measured from the date of this Report. This category excludes material deliverable within one year under other than spot or near-term contracts.

[2] For delivery beyond one year, measured from the date of this Report.

Projects removed since last month: 89-1201, 90-1027.

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MARKET REVIEW

Uranium Demand

(June 30, 1990)

NUEXCO Project Number	Quantity (Thousand Pounds equivalent U_3O_8) Spot or Near-term[1]	Intermediate or Long-term[2]	Delivery Period	Remarks
Inquiries to Purchase:				
ACTIVE				
90-1100A	45	--	1991	UF6e
90-1126	350	--	1991	
90-1138	350	--	1990	
90-1146*	450	--	1990	
90-1151*	230	--	1990	U_3O_8/UF6
90-1154*	500	--	1990	
90-1156*	250	--	1990	
90-1161*	260	--	1991	UF6
90-1163*	500	--	1990	U_3O_8/UF6
90-1166*	160	--	1990	
90-1167A*	300	--	1991	
90-1171*	75	--	1990	U_3O_8/UF6
90-1098	--	250 per year	1992-1994	
90-1113*	--	800	1991-1995	
90-1149*	--	300 per year	1992-2000	
90-1155*	--	325 per year	1991-1995	
Total	**3,470**			
INACTIVE	**1,860**			
Inquiries to Borrow	*No inquiries to borrow are reported*			

* New or revised since last month.

[1] For delivery within one year, measured from the date of this Report. This category excludes material deliverable within one year under other than spot or near-term contracts.

[2] For delivery beyond one year, measured from the date of this Report.

Projects removed since last month: 89-1233, 90-1024, 90-1077, 90-1092A, 90-1093A, 90-1111, 90-1114, 90-1119, 90-1120, 90-1121, 90-1125, 90-1139.

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Conversion Supply And Demand

(June 30, 1990)

NUEXCO Project Number	Quantity (Thousand Pounds U as UF_6) Within 3 Years [1]	Beyond 3 Years [1]	Remarks
Available for Sale	*No offers to sell are reported*		
Inquiries to Purchase			
ACTIVE			
90-1167B*	420	--	
90-1167C*	250	--	
Total	**670**		
INACTIVE			
None reported			

* New or revised since last month.

[1] Measured from the date of this Report.

Projects removed since last month: 89-7002, 90-1101, 90-1122, 90-1137.

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MARKET REVIEW

SWU Supply And Demand

(June 30, 1990)

NUEXCO Project Number	Quantity (Thousand SWUs) Spot or Near-term[1]	Intermediate or Long-term[2]	Delivery Period	Remarks
Available for Sale				
ACTIVE				
90-1078B	435	435 per year	1991-1993	UFe
90-7000*	----	1,000	1991 on	
Total	**435**			
INACTIVE				
None reported				
Inquiries to Purchase				
ACTIVE				
90-1100B	15	--	1991	UFe
88-1061	--	500	1991-1995	
89-1262	--	120 per year	1996-1999	
90-1076	--	350 per year	1992-1998	
90-1094	--	500	1992-2000	
90-1144*	--	60 per year	1992-2001	
Total	**15**			
INACTIVE	**1,545**			

*New or revised since last month.

[1] For delivery within one year, measured from the date of this Report.
This category excludes SWU deliverable within one year under other than spot or near-term contracts.

[2] For delivery beyond one year, measured from the date of this Report.

Projects removed since last month: 90-1071, 90-1092B, 90-1093B, 90-1022A, 90-1022B, 90-1109.

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MARKET VALUES EXPRESSED IN SELECTED CURRENCIES

EXCHANGE VALUE[1]

Country (currency)	per lb equivalent U3O8 as Concentrates			per kg U as Concentrates		
	This Month (June 30, 1990)	Last Month (May 31, 1990)	12 Months Ago (June 30, 1989)	This Month (June 30, 1990)	Last Month (May 31, 1990)	12 Months Ago (June 30, 1989)
Australia (dollar)	14.74	11.98	12.98	38.32	31.14	33.75
Belgium (franc)	398.63	320.18	401.80	1,036	832.40	1,045
Canada (dollar)	13.56	10.88	11.71	35.24	28.28	30.45
EEC (ecu)	9.38	7.54	9.22	24.39	19.59	23.98
Finland (markka)	45.58	36.40	43.29	118.49	94.63	112.53
France (franc)	65.14	52.50	65.29	169.35	136.48	169.74
Italy (lira)	14,233	11,451	13,917	37,003	29,770	36,180
Japan (yen)	1,775	1,400	1,408	4,614	3,641	3,660
Netherlands (guilder)	21.83	17.52	21.66	56.76	45.55	56.30
So. Africa (comm. rand)	30.79	24.54	27.09	80.06	63.79	70.44
Spain (peseta)	1,191	965.65	1,223	3,097	2,510	3,180
Sweden (krona)	70.22	56.20	65.29	182.55	146.10	169.74
Switzerland (franc)	16.48	13.17	16.50	42.84	34.23	42.89
UK (pound)	6.67	5.45	6.34	17.35	14.18	16.47
US (dollar)	11.60	9.25	9.80	30.16	24.05	25.48
West Germany (mark)	19.39	15.57	19.22	50.42	40.47	49.97

TRANSACTION VALUE[1]

Country (currency)	per lb equivalent U3O8 as Concentrates			per kg U as Concentrates		
	This Month (June 30, 1990)	Last Month (May 31, 1990)	12 Months Ago (June 30, 1989)	This Month (June 30, 1990)	Last Month (May 31, 1990)	12 Months Ago (June 30, 1989)
Australia (dollar)	11.18	11.07	13.84	29.07	28.79	35.99
Belgium (franc)	302.41	295.95	428.45	786.19	769.40	1,114
Canada (dollar)	10.28	10.06	12.49	26.74	26.14	32.47
EEC (ecu)	7.12	6.96	9.83	18.51	18.11	25.57
Finland (markka)	34.57	33.64	46.16	89.89	87.47	120.00
France (franc)	49.42	48.52	69.62	128.47	126.15	181.00
Italy (lira)	10,798	10,584	14,840	28,071	27,517	38,579
Japan (yen)	1,346	1,294	1,501	3,500	3,365	3,903
Netherlands (guilder)	16.56	16.20	23.09	43.06	42.11	60.04
So. Africa (comm. rand)	23.36	22.68	28.89	60.73	58.96	75.11
Spain (peseta)	903.77	892.58	1,304	2,350	2,321	3,391
Sweden (krona)	53.27	51.94	69.62	138.49	135.04	181.00
Switzerland (franc)	12.50	12.17	17.59	32.50	31.64	45.74
UK (pound)	5.06	5.04	6.76	13.16	13.11	17.57
US (dollar)	8.80	8.55	10.45	22.88	22.23	27.17
West Germany (mark)	14.71	14.39	20.49	38.25	37.41	53.28

[1]Calculated using currency exchange rates published in *The Wall Street Journal* on the last working day of the month.

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MARKET REVIEW

CONVERSION VALUE[1]

Country (currency)	per lb U as UF_6			per kg U as UF_6		
	This Month (June 30, 1990)	Last Month (May 31, 1990)	12 Months Ago (June 30, 1989)	This Month (June 30, 1990)	Last Month (May 31, 1990)	12 Months Ago (June 30, 1989)
Australia (dollar)	1.84	1.88	2.58	4.06	4.14	5.70
Belgium (franc)	49.83	50.19	79.95	109.85	110.65	176.26
Canada (dollar)	1.69	1.71	2.33	3.74	3.76	5.14
EEC (ecu)	1.17	1.18	1.84	2.59	2.60	4.05
Finland (markka)	5.70	5.71	8.61	12.56	12.58	18.99
France (franc)	8.14	8.23	12.99	17.95	18.14	28.64
Italy (lira)	1,779	1,795	2,769	3,922	3,957	6,105
Japan (yen)	221.85	219.53	280.13	489.09	483.98	617.58
Netherlands (guilder)	2.73	2.75	4.31	6.02	6.06	9.50
So. Africa (comm. rand)	3.85	3.85	5.39	8.49	8.48	11.89
Spain (peseta)	148.92	151.37	243.38	328.30	333.72	536.57
Sweden (krona)	8.78	8.81	12.99	19.35	19.42	28.64
Switzerland (franc)	2.06	2.06	3.28	4.54	4.55	7.24
UK (pound)	.83	.85	1.26	1.84	1.88	2.78
US (dollar)	1.45	1.45	1.95	3.20	3.20	4.30
West Germany (mark)	2.42	2.44	3.82	5.34	5.38	8.43

SWU VALUE AND UF_6 VALUE[1]

Country (currency)	SWU Value at 0.30% Tails Assay			UF_6 Value per kg U as UF_6		
	This Month (June 30, 1990)	Last Month (May 31, 1990)	12 Months Ago (June 30, 1989)	This Month (June 30, 1990)	Last Month (May 31, 1990)	12 Months Ago (June 30, 1989)
Australia (dollar)	63.54	64.75	87.44	40.67	33.02	40.07
Belgium (franc)	1,718	1,731	2,706	1,100	882.66	1,240
Canada (dollar)	58.43	58.80	78.87	37.40	29.99	36.14
EEC (ecu)	40.44	40.73	62.11	25.88	20.77	28.46
Finland (markka)	196.45	196.75	291.52	125.73	100.34	133.61
France (franc)	280.77	283.77	439.71	179.69	144.72	201.53
Italy (lira)	61,350	61,897	93,723	39,264	31,567	42.957
Japan (yen)	7,650	7,570	9,481	4,896	3,861	4.346
Netherlands (guilder)	94.11	94.71	145.86	60.23	48.30	66.85
So. Africa (comm. rand)	132.73	132.63	182.47	84.95	67.64	83.63
Spain (peseta)	5,135	5,220	8,238	3,286	2,662	3,776
Sweden (krona)	302.66	303.77	439.71	193.70	154.92	201.53
Switzerland (franc)	71.02	71.17	111.11	45.45	36.30	50.92
UK (pound)	28.76	29.48	42.68	18.41	15.04	19.56
US (dollar)	50.00	50.00	66.00	32.00	25.50	30.25
West Germany (mark)	83.60	84.15	129.44	53.50	42.91	59.32

[1]Calculated using currency exchange rates published in *The Wall Street Journal* on the last working day of the month.

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RECENT DEVELOPMENTS

WEST GERMANY

Nukem Ownership Change

RWE AG has agreed to purchase the 35-percent interest in Nukem GmbH from Degussa AG, a metal and chemical company. This boosts the interest held by RWE, West Germany's largest utility and energy concern, to a 90-percent ownership share in Nukem, up from 55 percent. RWE had increased its share from 45 percent to 55 percent in June 1989 when it purchased the 10-percent interest held by Imperial Smelting Corporation of the UK, a wholly-owned subsidiary of the RTZ Corporation. The latest transaction continues the consolidation and reorganization of the German nuclear industry that began in late 1987. Degussa stated that the redirection of Nukem's activities away from the fuel fabrication industry and toward solar energy and process engineering has been successfully initiated, and has resulted in Nukem being more closely associated with RWE.

Nukem's nuclear fuel cycle services unit remains active in the uranium market. In 1989 it successfully bid to purchase about one-quarter of the BMFT (German Ministry for Research and Technology) enriched uranium stockpile, a share valued at 100 million Deutschemarks. The company has agreed to purchase and is currently in final negotiations with Queensland Mines Limited (QML) of Australia to buy QML's uranium inventory and contractual obligations. Nukem is also associated with US Energy, a US uranium production company.

The diagram (**Figure 1**) on the following page shows the basic structure of the West German nuclear fuel industry following the Nukem ownership changes. The diagram does not include the ownership structure of each company; rather, it focuses on some of the key organizations and their most important activities. The accompanying sidebar provides a chronology of some of the major events and structural changes that have affected Nukem. □

Chronology of Major Events

Fall 1987

Following allegations of wrongdoing, the West German government begins an investigation of Transnuklear-Hanau (TNH), a subsidiary of Nukem responsible for nuclear fuel and waste transportation. The West German government announces its intention to reorganize and simplify the nuclear fuel industry in Germany.

March 1988

Nukem begins implementing a plan to sell all of its shares in TNH, including agreeing to sell TNH's non-German subsidiaries to Transnucléaire, Paris. Degussa AG takes over management of Nukem. Nukem also moves to dispose of its fuel fabrication activities.

September 1988

Nukem sells its 40-percent interests in ALKEM GmbH and RBU GmbH to Siemens AG as part of its redirection away from nuclear fuel fabrication, and toward a concentration on engineering, production, and services. Siemens now effectively owns 100 percent of both firms and combines ALKEM and RBU to form Siemens-Brennelementewerk Hanau (SBH).

June 1989

RWE becomes the 55-percent majority shareholder in Nukem, when it purchases the ten percent interest held by Imperial Smelting Corp. (ISC)—a wholly-owned subsidiary of the RTZ Corporation (UK). RWE begins to exert management control over the organization. Degussa owns 35 percent, and Metallgesellschaft AG owns the other 10 percent.

June 1990

RWE buys Degussa's 35-percent interest in Nukem, boosting its ownership to 90 percent. Metallgesellschaft remains as a 10-percent minority owner.

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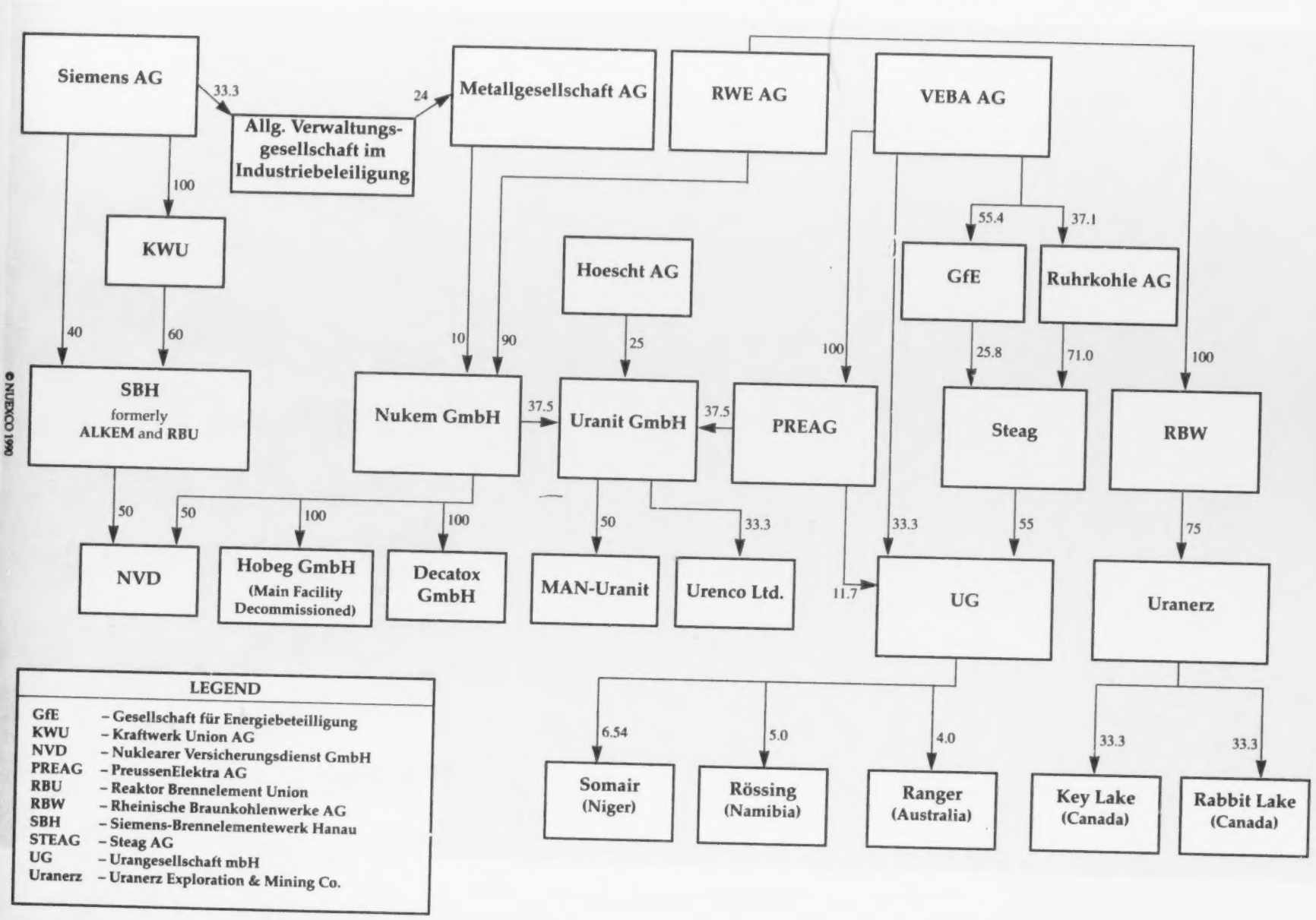
Figure 1
German Nuclear Fuel Industry—Basic Ownership Structure (RWE and VEBA interests)



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NAMIBIA

SWAPO Nationalization Policy Uncertain

The South West Africa People's Organization's (SWAPO) moderate pre-election stance on the nationalization of Namibian industry appears to be shifting, at least in regard to mining. Although Andimba Toivo ya Toivo, Namibia's Minister of Mines and Energy, recently stated that any mine ownership changes would be made slowly to avoid disrupting current production levels, he also said that the outflow of dividend income to other countries would have to be reduced. Any changes would have an affect on Rössing, the world's second largest uranium producer.

SWAPO recently conducted a review of the mining industry, with primary assistance from the Commonwealth Fund for Technical Assistance (CFTC) through its Technical Assistance Group (TAG). The group discussed its recommendations with SWAPO in May, at which time the government asked TAG to draft new mining legislation. TAG's primary recommendation is to boost the state's earnings by increasing the flow of tax revenues from current operations rather than changing the ownership structure of the industry. If SWAPO elects to implement these recommendations, TAG estimates the state's revenues from mining would rise by about six percent. Although Namibia does not wish to discourage foreign investment, TAG released a policy document in June which noted that mining projects might carry some government ownership requirements in the future.

SWAPO is negotiating a joint venture in the diamond industry with CDM (a De Beers subsidiary, which accounts for 50 percent of Namibia's mineral exports), and will likely participate in CDM's marketing. No immediate changes are expected at the Rössing mine, in which the government holds a 3.5-percent equity interest as well as 50 percent of the voting rights. And until Namibia drafts new mining legislation, Rössing will remain subject to South Africa's Nuclear Energy Act. Since mining accounts for 80 percent of Namibia's exports and more than a third of its domestic revenues, however, the mining industry will continue to be an attractive target for nationalization. ■

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WASHINGTON FOCUS

Congress has made progress on key legislation this summer. The House of Representatives passed an appropriations bill which authorizes spending for DOE and the NRC for FY91. The Senate has yet to consider an energy appropriations bill, but as the House bill exceeds the administration request for funding by $575 million, it will likely experience substantial cuts before its final passage. At the end of the month, the Senate Energy & Natural Resources Committee held a hearing on the Smith Barney report on the Uranium Enrichment Enterprise. Since the Senate has already passed a uranium enrichment restructuring bill, attention has shifted to the House where some Representatives have expressed interest in holding a hearing on the report.

After almost a month's delay, the House has named its representatives to the Clean Air Act Conference Committee. The Senate will have nine committee members, and the House will have 142 conferees from seven committees. Final action on the clean air bill is likely before November's Congressional elections.

Finally, although it appeared the utilities had a chance to hold their payment of NRC user fees at 45 percent of the NRC's budget level, President Bush's decision to discuss taxes as part of the budget negotiations increases the likelihood of higher user fees—possibly as high as 100 percent of the NRC budget. The American Nuclear Energy Council (ANEC) estimates that the President's proposal to recover 100 percent of the NRC's budget through user fees is the second largest revenue item among the user fees proposed.

FY91 Energy Appropriations Bill

◇ The House approved the Energy and Water Development Appropriations bill for FY91 by a vote of 355 to 59. While some of DOE's nuclear activities received small increases over last year, the total budget for nuclear energy declined from almost $582 million in FY90 to $313.5 million in FY91. Some R&D priorities shifted as the House bill increased light water reactor (LWR) R&D from $24.4 million in FY90 to $31.5 million, and reduced advanced reactor R&D from $58.8 million in FY90 to $47 million in FY91.

The uranium enrichment program received its requested $1.15 billion appropriation, since it is offset by revenues. AVLIS will be funded at the $154.5 million level (a $22.2-million increase from FY90). Although DOE based its budget request on the assumption that enrichment program restructuring legislation would be enacted, the House bill prohibits DOE from setting up accounts for a $50-million decontamination and decommissioning fund, paying $29 million on a $364 million "debt," or creating a working capital fund of $45 million for the future government corporation. The bill does not authorize DOE to purchase any enrichment services, noting that this issue, as well as the above accounts, should be discussed during debate on a restructuring bill. By denying the department this spending authority, the House has effectively created a $124 million fund from utility revenues which the House can allocate among other programs. The House also approved $293 million for the civilian nuclear waste program, $2 million less than FY90.

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DOE June 22 Customer Meeting

◇ DOE held its USEC customer meeting on June 22 in Washington, D.C. It announced there would be no price increase for FY91, and that the $117.85 ceiling price currently in effect would remain through FY91. There is some indication that DOE may be considering what has been termed an Incentive Price III (IP3) or an alternative contract form in an effort to lock in customers prior to the expiration of their commitments in 1996. AVLIS remained a major topic of conversation at the meeting.

Senate Hearing on Smith Barney Report

◇ On June 28 the Senate Energy R&D subcommittee held a hearing on the Smith Barney report. DOE Deputy Secretary Henson Moore and William H. Timbers, Jr., Managing Director of Smith Barney, Harris Upham & Company, testified. Prior to the hearing, Coopers & Lybrand, a subcontractor to Smith Barney, recalculated its figures for unrecovered costs based on Federal Energy Regulatory Commission rules on recovery of prudently incurred costs (a 50-50 split between customers and shareholders). In a letter to Mr. Timbers, Coopers states that its original calculation of approximately $4.5 billion debt, less the 50 percent for policy costs of $5.7 billion (TVA demand charges, GCEP abandonment, excess capacity), resulted in a net over-recovery as of September 30, 1989, of approximately $1.2 billion.

DOE, in a letter from Assistant Secretary for Nuclear Energy Bill Young to Sen. Wendell Ford, concurred with the new analysis that there is no debt, and thus testified that the new enrichment corporation should be established with no initial debt. While DOE apparently agrees with most of the report's conclusions, as Moore's testimony revealed, DOE does not agree with them on the AVLIS deployment schedule and its costs.

Little was said about a possible agreement to purchase Soviet SWU, even though the report endorses the idea. Henson Moore, when asked about such a deal, indicated that an interagency review group was looking at it, but that DOE is more committed to moving a restructuring bill through Congress.

Efforts by the Senate, DOE, and industry lobbyists to create some interest in the House for a restructuring bill are succeeding. At least two committees—Interior and Science, Space & Technology—are planning to hold hearings on the Smith Barney report this summer Unfortunately, it appears there will not be enough time in this legislative session for the House to consider a bill.

Schedule for AVLIS Deployment

◇ Although DOE publicly disagreed with Smith Barney's assessment of DOE's ability to deploy AVLIS in a timely fashion, DOE is already behind on portions of its original schedule, published last January. Revisions to 10 CFR Part 725, which would allow industrial access to the AVLIS technology (which is classified as Restricted Data), were published two months behind schedule in April. Despite the delay, the comment deadline remains June 22, and the program will begin on schedule in August. The

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Schedule for AVLIS Deployment (cont.)

Industrial Access program is on a parallel course with the Commercial Deployment Contractor selection process. A procurement board has been named, and a statement of work should be published sometime this summer. The industrial access program is meant to create a suppliers' network for the technology, as well as to allow access for potential contractors. According to a DOE official, one unclassified briefing is under consideration for qualified industrial participants.

On June 18, DOE published its notice of intent to prepare an environmental impact statement for potential AVLIS sites. While DOE announced it will only consider DOE sites, not all of its 47 sites will meet the criteria for consideration, such as experience with handling nuclear materials, and the existence of uranium processing facilities. According to the original schedule, draft siting criteria guidelines were to be issued in April, with a final notice in July. The actual notice, with comments due by July 19, reduces the amount of time for internal review before final site criteria are established, if DOE is to select a short list of alternative sites by December 1990. According to a DOE official, the fact that most of the logical site choices (the current GDP sites) are environmentally contaminated will not affect its decision-making process.

Work is proceeding on other parts of the AVLIS fuel cycle as planned. DOE is in the process of signing contracts with all five domestic fuel fabricators and has held meetings with the international fuel fabricators as well. These contracts ask the fabricators to look into the alterations necessary in their production processes for the AVLIS fuel cycle, and to consider whether sample testing will be necessary. Talks with the domestic converters have begun, but DOE (at Oak Ridge) is still working on the R&D for this process. The actual AVLIS process demonstration is still on schedule. Alignment of the lasers with the separators is scheduled to begin in October, with operational testing to start in April 1991. The first SWU is not scheduled to be produced until December 1991. The uranium enrichment branch has asked for the authority to increase its staff to handle the additional managerial and regulatory oversight necessary to move AVLIS forward, but DOE management has not yet authorized the additional staff. ■

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INDUSTRY BRIEFS

Japan to Build 40 Nuclear Power Plants

According to a June 5 announcement by the Ministry of International Trade and Industry (MITI), Japan will add 40 nuclear power plants in the next 20 years. Japan's nuclear program prior to the announcement included 14 plants under construction plus 13 more planned. Japan currently has 38 operating plants supplying about eight percent of the country's electricity. MITI forecasts a 38-percent growth in Japan's electricity demand between 1988 and 2010.

♦♦♦

RWE Buys Degussa's Interest in Nukem

RWE AG, the West German industrial giant, bought Degussa AG's 35-percent interest in Nukem GmbH. RWE now holds a 90-percent interest in Nukem. (See article on page 13.)

♦♦♦

Soviet–E. German Uranium Project Restructured

The Soviet Union and East Germany have reached agreement to restructure the Wismut uranium project operated at Crossen in East Germany since the late 1940's. Discussions are underway concerning tailings disposal and other operational details.

Chinon A3 Shut Down

Electricité de France (EdF) closed Chinon A3, its oldest operating reactor, on June 15. The 500-MWe unit had operated for 24 years and produced 31.5 billion kilowatt hours of electricity. Only two operating GCRs remain in France—Bugey 1 and St. Laurent A2. Both are scheduled to be decommissioned in 1992.

♦♦♦

Italy to Close Last Two Nuclear Units

The Italian Parliament voted on June 13 to permanently close the country's last two nuclear plants, which have been mothballed since November 1987. The 270-MWe Trino PWR and the 862-MWe Caorso PWR will be decommissioned after 42 and 10 years, respectively, of operation. Italy continues to support passively safe reactor development.

♦♦♦

Rio Algom Buys Into Uranium Resources

Rio Algom Mining Corp. purchased 2,096,497 shares of Uranium Resources, Inc.'s (URI) common stock, as well as warrants for an additional 7,109,235 shares. The private transaction for nine million shares, which could be valued at up to $22 million, represents about 25 percent of the company.

Duke to Sell Partial Interest in LES

As soon as Louisiana Energy Services (LES) receives an NRC license for its proposed enrichment facility, Duke Power Co., 29-percent owner in LES, plans to sell the large majority of its interest to help fund the plant's construction. Two of the three utility partners (Duke and Northern States Power) are seeking to recoup their investments in LES through rates.

♦♦♦

China To Accelerate Nuclear Power Program

China National Nuclear Corporation (CNNC) released plans to accelerate China's nuclear power program to alleviate its energy shortage. By the year 2000, nuclear generating capacity should reach 6,000 MWe, and an additional 6,000 MWe should be under construction. By 1991, China's first indigenous nuclear power plant, a 300-kWh PWR at Qinshan, is scheduled to enter commercial operation.

China also plans to construct an experimental reprocessing plant in Lanzhou, to begin operating in 1998. The plant will be capable of handling 100 kg of nuclear waste per day.

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ANALYSIS AND COMMENTARY

FIRST HALF 1990 MARKET REVIEW

Uranium

On March 31, 1990, for the first time since September 1987, the NUEXCO Exchange Value (EV) increased, rising $0.10 to $8.80 per pound U_3O_8. The market responded cautiously, unsure if this price rise signalled a true market reversal or was merely an anomalous uptick. The April 30 EV was unchanged, but the EV's $0.45 rise on May 31 and its $2.35 increase on June 30 (a 25-percent rise and the highest percentage increase in its 22-year history), appeared to indicate that prices had bottomed, the long-awaited turnaround had occurred, and an uptrend was underway. This surprised some who had anticipated neither the timing of the upturn, nor the rapidity of the price rise. What factors led to the current price rise?

Uranium inventories are still well above optimal levels, and large quantities remain available for loan—factors which would seem to argue against any substantial or permanent price increase. But other factors and perceptions, which have grown in importance during the past few months, have come to dominate the market.

- ◆ Sharp reductions in near-term supply, as a result of record sales volume during the first half of the year, and the successive withdrawal of sellers (both traders and producers) from the market as prices declined;
- ◆ Heavy, visible, and continuing procurement activity of some producers (following their withdrawal from the market as sellers);
- ◆ Concerns that market participants with outstanding loans might suddenly become large buyers in order to replace material previously borrowed;
- ◆ Utility decisions, in anticipation of higher prices, to advance their procurement plans, thereby adding to near-term demand;
- ◆ Recognition that, in light of the longer-term supply/demand balance and uranium production costs, the very low absolute level of spot prices (below $9.00) could not be maintained indefinitely.

These factors strengthened throughout the first two quarters of the year and contributed to the recent price increase.

Table 1
1990 NEAR-TERM URANIUM SALES

	Volume (Million Pounds) Equivalent U_3O_8)	Number Of Sales
January	0.9	2
February	4.3	11
March	4.0	6
April	4.4	13
May	5.1	13
June	4.0	22
Total	**22.7**	**69**

Spot and Near Term Sales

As 1990 began, the erosion of uranium prices continued, as the January 31, 1990 EV declined another $0.15 from the previous month. January was a typically slow month, and only two spot sales, totalling approximately 900 thousand pounds equivalent U_3O_8, occurred. Some potential buyers, anticipating further price weakening, hesitated to make purchase commitments. With spot prices below the $9.00 level, sellers were equally hesitant to make sales commitments.

Active uranium supply (material available for sale at competitive prices) was abundant (over six million pounds equivalent U_3O_8) in January, and almost as much was available for loan. Although most of the supply took the form of concentrates, UF_6 was also in ample supply. As the first quarter progressed, market participants began to perceive a UF_6 oversupply and an impending shortage, at least in the near-term, of concentrates. Although the EV dropped $0.15 more in February to $8.70, it rose $0.10 in March as active demand began to exceed active supply, intensifying concerns of tightening supply.

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Believing that the market bottom was near, many buyers scrambled to take advantage of the historically low prices. From February through April almost 13 million pounds equivalent U_3O_8 changed hands; near-term uranium sales volume surged to over five million pounds in May alone (**Table 1**). The EV remained at $8.80 on April 30, 1990, but rose sharply to $9.25 on May 31. On June 30, the EV jumped to $11.60. Almost four million pounds equivalent U_3O_8 were sold in 22 sales during June.

Evidencing the high activity level of activity in the uranium market during the first six months of 1990, a record 23 million pounds equivalent U_3O_8 changed hands in 69 sales. Utilities purchased about half of this material, followed by producers at approximately 23 percent. Intermediaries bought 12 percent of all uranium, while other entities accounted for the remainder.

Sales by intermediaries exceeded 16 million pounds equivalent U_3O_8, accounting for more than two-thirds of the total. Utilities ranked second in selling volume, accounting for about 14 percent of the total. Producers were largely absent from the market as sellers, accounting for only eight percent of all sales. This development gave a clear signal to the industry that conventional supply sources were limited in the spot and near-term markets. Almost 80 percent of material was sold by US entities, 16 percent by European entities, and two percent by Canadian.

Long-Term Sales

The long-term uranium market was also extremely active in the first half of 1990, registering a total sales volume of approximately 40 million pounds equivalent U_3O_8 in 26 sales. This already exceeds all of 1989's volume of 35 million pounds. Most of the 1990 sales involved concentrates; four were UF_6, and one EUP.

Producers sold more than three-fourths of the long-term material, followed by intermediaries. Twenty-three of the 26 buyers were utilities.

Transaction Value

The Transaction Value (TV), which began the year at $9.40 per pound equivalent U_3O_8, steadily decreased through May 31, falling below the EV during March, April, May, and June. The Transaction Value is designed as a lagging indicator, so this kind of behavior is typical when there is a change in market direction. Additionally, in this case the differences between the Transaction Value and the EV were accentuated by the inclusion in the TV calculations of many UF_6 sales. At the end of June, the TV turned upward to $8.80, giving its first evidence of the market turnaround.

Loans

Heavy borrowing took place during the first six months of 1990; NUEXCO reported 24 loans totalling over 9 million pounds equivalent U_3O_8. In comparison, a total of only 8.8 million pounds were loaned in all of 1989, and only 2.0 million in 1988. The Loan Rate remained at 3.5 percent, unchanged since November 30, 1987.

As in the past, utilities supplied the largest share (48 percent) of the loaned material, followed by producers at 34 percent; fabricators accounted for the remainder. Intermediaries were overwhelmingly the largest borrowing group, taking 89 percent of all material. Two utilities borrowed approximately one million pounds total.

Conversion

Twelve conversion sales are reported this year to date for a total of about 3.6 million pounds U as UF_6. Intermediaries were sellers in seven of the sales, while all twelve purchasers were utilities. The Conversion Value declined slowly but steadily between December 31, 1989 and June 30, 1990, beginning at $1.65, falling to $1.50 the next two months, and then declining to $1.45 for the next three months.

Enrichment

Activity in the enrichment services market was unusually high for the first half of 1990—22 transactions are reported totalling approximately 3.8 million SWU. In contrast, a total of 18 transactions were reported in 1989 totalling 1.8 million SWU. The NUEXCO SWU Value fell $4 on February 28, 1990, from $54 to $50 per SWU, and has remained at that level since then.

One large long-term sale between a European producer and a Far Eastern utility accounted for about 44 percent of this year's volume. Intermediaries sold the next greatest volume (almost 1.5 million SWU), followed by utilities (400 thousand), and fabricators (100 thousand). Utilities purchased almost 89 percent of all enrichment services, while intermediaries and one fabricator accounted for the difference. ■

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ANALYSIS AND COMMENTARY

WORLD URANIUM REQUIREMENTS 1990–2005

The following article is a review of the uranium requirements section of the 1990 NUEXCO Market Analysis and Price Trend Projections for Nuclear Fuel Materials and Services. *It provides a summary of the forecast of worldwide uranium requirements for 1990–2005. Detailed forecast scenarios are contained in the complete report and are available from NUEXCO Information Services.*

Overview

NUEXCO's projection for uranium requirements falls somewhat lower this year than in the past. Several factors affected this year's forecast, including more efficient uranium utilization designs and higher batch discharge burnups, the cutback of the United Kingdom's nuclear reactor construction plans to only one unit, evolving inventory policies, and changing enrichment requirements. The effect of these factors has been more accurately assessed because NUEXCO's calculation model has been enhanced since last year to better track the annual changes in requirements. The uranium requirements projection is based upon NUEXCO's projection of installed nuclear generating capacity and anticipated capacity factors for those units. An expected growth rate of 1.4 percent per annum from 1990 through the year 2000 leads to cumulative world uranium requirements for 1990-2005 of 2.2 billion pounds equivalent U_3O_8. The average is almost 138 million pounds per year.

The full NUEXCO report examines different scenarios incorporating varying degrees of optimism or pessimism with regard to: cancellation of partially completed, but presently halted reactors; completion dates of reactors actively under construction; and the construction start and completion dates of planned reactors. For example, the high growth case projects the completion of all halted reactors, and the completion of more new reactors than currently scheduled. The low growth case however, assumes the cancellation of all halted reactors, major slippage of completion dates on reactors under construction, and no completion of presently unplanned reactors after 2000. The reference case is used throughout the article. It assumes some slippage of construction schedules, and the cancellation of most reactors whose construction is indefinitely halted. It also assumes that the late 1990s growth rate of nuclear programs will continue during the early post-2000 time frame.

Methodology

The term "requirements," as used by NUEXCO, refers to the amount of natural uranium in the form of concentrates that must be delivered to a conversion facility in order to begin preparation of fuel assemblies based on normal lead times. For an initial core load, NUEXCO assumes a 30-month lead time prior to the Commercial Operation Date (COD) of a reactor. Reload calculations use an 18-month lead time. The amount of uranium is expressed in million pounds U_3O_8.

Calculations are based on five principal factors affecting uranium requirements:

- Nuclear electric generating capacity in operation as well as annual additions.
- Nuclear plant design characteristics:
  - Operating life
  - Core loading
  - Thermal efficiency
- Nuclear plant operating characteristics:
  - Capacity factor
  - Cycle length
- Nuclear fuel characteristics:
  - Fuel assembly design
  - Initial core enrichment and burnup
  - Reload fuel enrichment and burnup
- Fuel cycle characteristics:
  - Enriching tails assay
  - Recycle of uranium
  - Recycle of plutonium
  - Fuel preparation lead times
  - Fuel processing losses

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Table 1
URANIUM REQUIREMENTS AND GROWTH RATE BY REGION

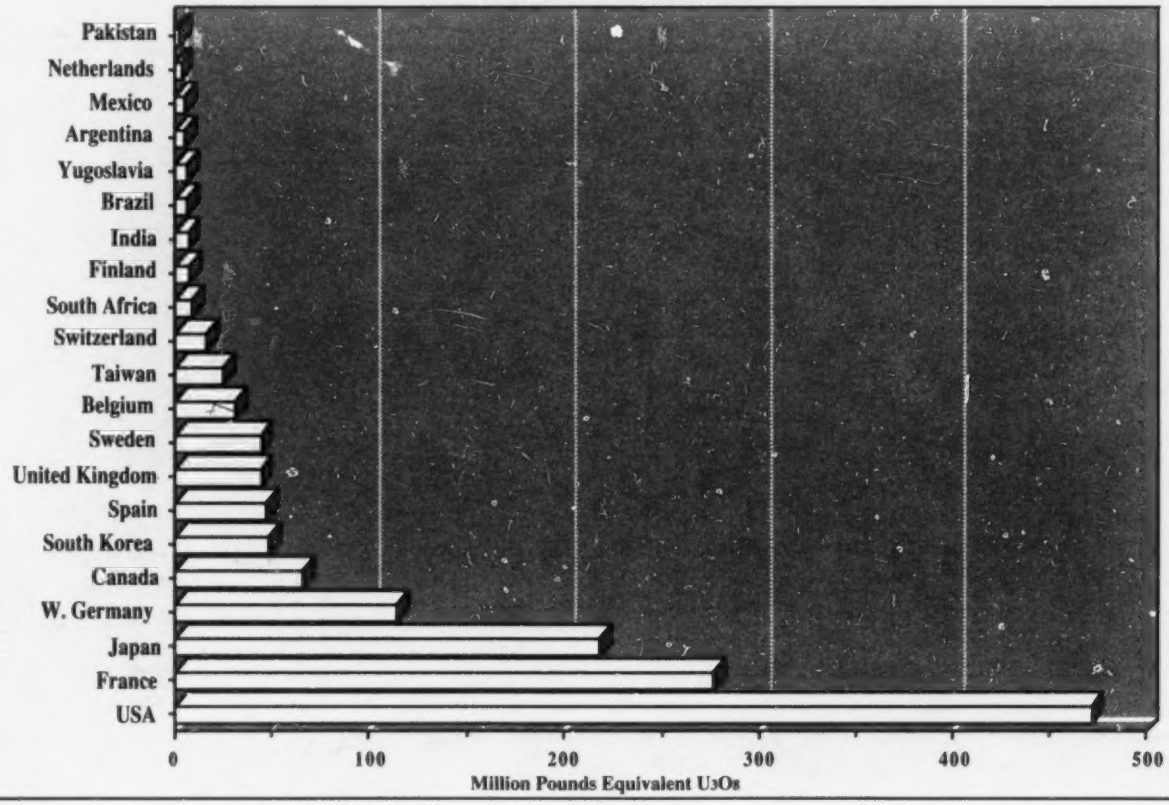
Region	Requirements (Million Pounds Equivalent U_3O_8) 1990	2000	2005	Growth Rate (Percent per Year) 1990-2000
Europe	52	56	67	0.9
Far East	21	31	36	3.8
Other Countries[1]	7	10	12	3.4
USA	42	43	44	0.3
Total	**122**	**140**	**159**	**1.4**[2]

[1] *Other Countries: Argentina, Brazil, Canada, India, Mexico, Pakistan, and South Africa*
[2] *Weighted average by region*

Regional Requirements

Seventy-five percent of the total natural uranium requirements of the nations included in this study will be needed by four countries: the USA, France, Japan, and West Germany. The average growth rate for uranium requirements is forecast at 1.4 percent per year. European and US uranium requirements will grow at rates of less than one percent annually, while the Far East's and other countries' requirements will grow at a rate of over three percent per

Figure 1
CUMULATIVE URANIUM REQUIREMENTS BY COUNTRY 1990 – 2000



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year. **Table 1** shows the projected requirements for each region for the years 1990, 2000, 2005, and the average annual growth rate expected this decade for each region.

The uranium requirements are based upon the reference growth case for installed nuclear capacity and projected capacity factor. In addition, the requirements estimates exclude any reductions due to the usage of inventory material or any recycling programs. Those materials are considered supplementary feed. **Figure 1** shows the cumulative uranium requirements by country for the years 1990-2000.

Nuclear Electric Generating Capacity

NUEXCO's projection of installed nuclear electric generating capacity for the reference case shows a growth in installed capacity to 326 gigawatts (GWe) in the year 2000. **Table 2** shows the breakdown of installed capacity and growth rate by region. This represents a 1.8-percent average annual growth rate during the 11-year period of 1990 through 2000. This compares to the 10.4-percent average annual growth rate of capacity for the period

Table 2
INSTALLED NUCLEAR ELECTRICAL CAPACITY AND GROWTH RATE BY REGION

Region	Capacity (GWe) 1989	2000	Growth 1989-2000 GWe	Percent	Percent/year
Europe	116	129	13	11	1.0
Far East	40	67	26	65	4.5
Other Countries	17	28	10	61	4.4
United States	96	103	7	7	0.6
Total	**269**	**326**	**57**	**21**	**1.8**

Figure 2
HISTORICAL AND PROJECTED NUCLEAR ELECTRIC CAPACITY NET ADDITIONS

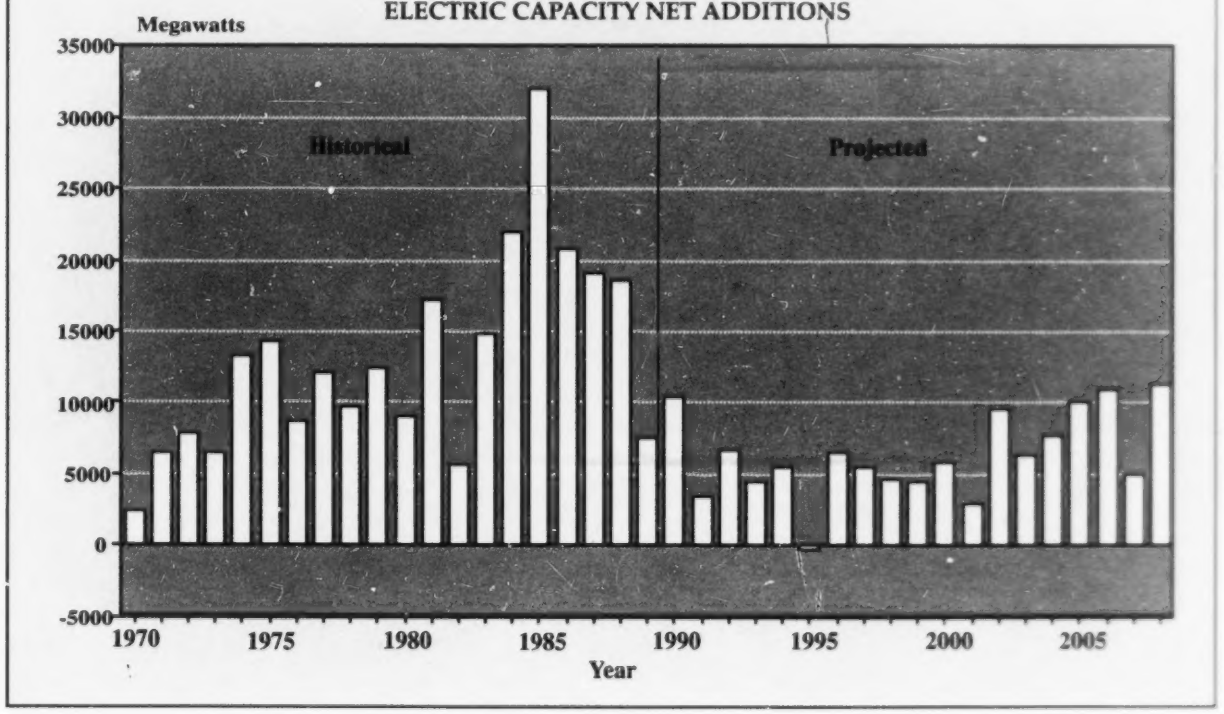

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Table 3
FACTORS CONSIDERED IN CAPACITY PROJECTIONS

- Electricity demand growth rates
- Political and societal environments
- Financial resources of operating entities
- National energy plans
- National construction experience
- Specific construction plans and schedules
- Current status and construction progress
- Construction management expertise
- Licensing progress and/or backlog
- Public acceptance of nuclear power
- Projected plant lifetimes
- Public utility regulatory considerations

1978–1989. **Figure 2** displays a bar chart of net annual additions to installed capacity from 1970 to 1989, and projected additions through 2008. This graph vividly shows the reduced growth rate of capacity additions.

In the preparation of these projections, NUEXCO examined the civilian reactor program within each country. The study estimated reactor CODs, retirements (reactor life is assumed to be 40 years unless other plans were announced), completion of planned units, and cancellations. This information, along with the factors listed in **Table 3**, led to the capacity forecasts and subsequent uranium requirements projection.

Figure 3 gives a breakdown of projected installed capacity for 1990, 2000, and 2005 by reactor type. Boiling Water Reactors (BWR) maintain about a 25-percent share of generating capacity throughout the analyzed time period. Gas Cooled Reactors (GCR), Advanced Gas Reactors (AGR), and other reactor types decline in share over the same period. Heavy Water Reactors (HWR) remain at just over six percent during the span of the projection. Pressurized Water Reactors (PWR) contribute the largest share of capacity in 1990, growing from 63 percent to over 66 percent by 2005.

Figure 3
PROJECTED INSTALLED CAPACITY BY REACTOR TYPE

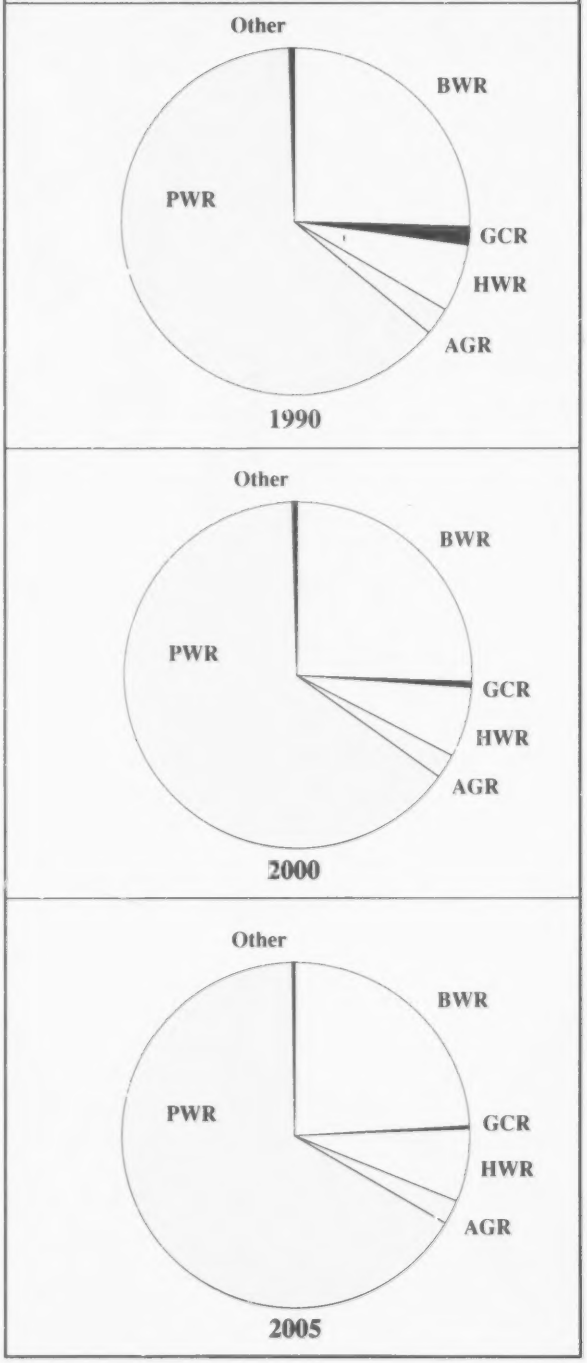

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Table 4
AGGREGATE CAPACITY FACTOR BY REGION

Region	1987-1989 (percent)	2000 projection (percent)
Europe	67.4	72.0
Far East	73.7	76.5
Other Countries	67.3	69.8
USA	63.8	69.2
Total	**67.0**	**71.8**

Nuclear Plant Operating Characteristics

Reactor capacity factors (CF) directly affect the uranium requirements calculation. The CF of a specific reactor is defined as the ratio of actual electrical production over a period of time to the theoretical maximum production that could have been obtained had the reactor operated at full power for 100 percent of the time. For each reactor operating during 1987-1989, the analysis uses the average of those three years for that reactor's 1990 CF. For reactors completed after 1987, the projection uses the average capacity factor for that type of reactor as its 1990 capacity factor estimate. To allow for reasonable future improvements at a plant, the analysis assumes that the CF will increase gradually each year as a ramp function toward a maximum feasible capacity factor for that reactor type. This improvement function depends on the specific characteristics of the reactor such as whether it refuels on-line or shuts down for refueling. **Table 4** gives the aggregated average capacity factor for 1987-1989 by region. The table also provides a projection of aggregate CF for each region for the year 2000.

The cycle length also affects uranium requirements. A substantial trend toward longer operating cycles has developed in the USA, but to a much lesser extent elsewhere in the world. Thus, NUEXCO's US projections take into account the effect of longer cycle lengths. Increases in cycle length result in higher fuel costs, but may be offset by a reduction in downtime. Since longer cycles theoretically result in less downtime for fuel reloads, plant capacity factors generally should be improved. In addition, longer cycle lengths tend to increase uranium requirements slightly per unit of energy production.

Fuel Cycle Characteristics

In the 1980s, two technological developments emerged in LWR fuel fabrication that will significantly affect future requirements—improved uranium utilization designs and higher batch average discharge burnups. Since only a quarter, or at most one half, of the core is replaced during a refueling, it requires three to six years to realize the full benefits of improved uranium utilization. Improvements vary by reactor type and by how soon a country begins to incorporate the new designs in its energy plans. Sweden, West Germany, and the USA already have begun using the improved designs.

Given the projected rate of implementation of the improved designs, uranium utilization by BWRs may improve by nine percent by 2000; concurrently, utilization by PWRs may improve by five percent by the end of the decade. The study's uranium requirements projection allows for this reduction of requirements. It also takes into consideration improved discharge burnups resulting from improved designs and changing fuel cycle policies by some utilities. Although not expected, fuel failures arising from the new designs could delay the acceptance of the designs, and thus would tend to increase uranium requirements. While present fuel failure rates are negligible at less than one percent, NUEXCO's requirements projections take into account the potential risk of fuel failures that may occur when the new designs are fully implemented (post-1995).

Enrichment tails assays also significantly influence uranium requirements. The higher the tails assay, the more uranium feed is required. As a rough estimate, a tails assay change of 0.01 percentage points (such as 0.25 to 0.26 percent) changes the feed requirements by about two percent. For the time period of the study, the optimal enrichment tails assay was calculated to provide the minimum product cost based upon the projected uranium spot price and SWU contract price for each year. During

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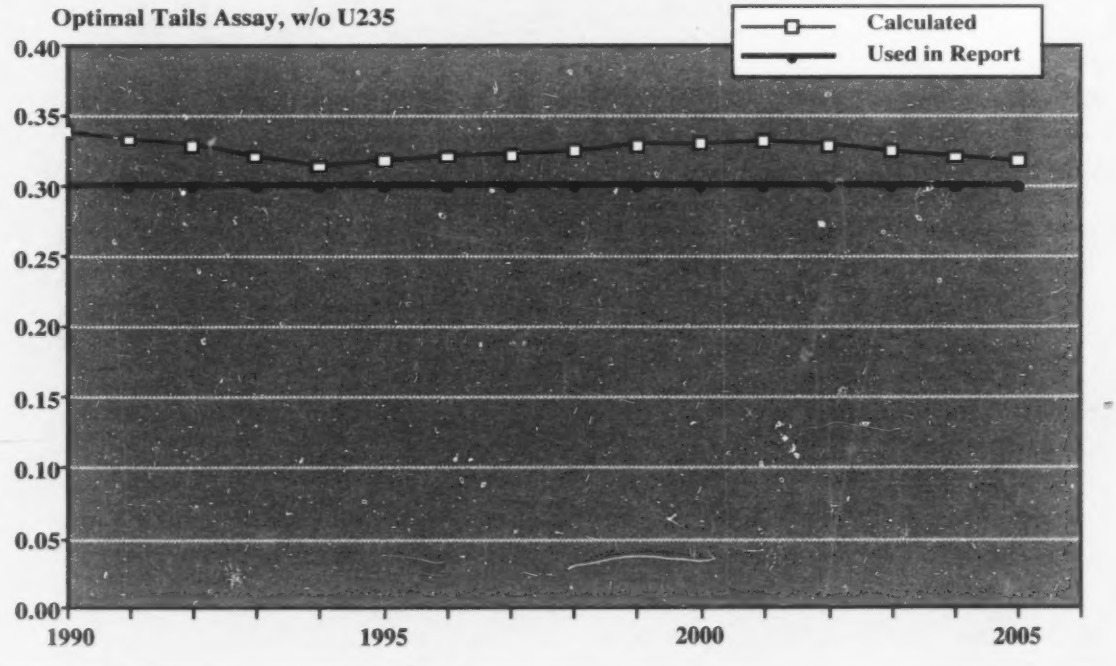
the years of the study period, the optimal tails assay exceeded 0.3 weight percent (w/o) U^{235}. However, most enrichers use an upper limit of 0.3w/o; thus, if a calculated tails assay exceeded 0.3w/o, the projections use 0.3w/o for that year. **Figure 4** shows the calculated optimal tails assay each year through 2005. As can be seen from the graph, the report used 0.3w/o throughout the period of the study. If the AVLIS or other laser-based enrichment processes are successfully deployed on a large scale in the latter 1990s, the tails assay projection would be too high, and actual uranium requirements for the future would be reduced. ■

Figure 4
ENRICHMENT TAILS ASSAY FOR MINIMUM PRODUCT COST



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CALENDAR

NUCLEAR INDUSTRY CALENDAR

1990

Sept. 4-7 ***International Seminar on the Costs and Financing of Nuclear Power in Developing Countries*** (Jakarta, Indonesia). Contact Conference Service Section, IAEA, P.O. Box 100, A-1400 Vienna, Austria.

Sept. 5-7 ***Uranium Institute 15th Annual Symposium*** (London, England). Contact the UI at 44-1-225-0308.

Sept. 13 ***The New Currency: How to Capitalize on Air Emissions Credits*** (Watergate Hotel, Washington, DC), sponsored by The Energy Daily. Contact Lissa Wilson at 1-202-662-9728.

Sept. 16-19 ***Uranium Seminar '90*** (Hyatt Regency, San Antonio, Texas), sponsored by the USCEA. Contact the USCEA Conference Office at 1-202-293-0770.

Sept. 23-26 ***AMC Mining Convention*** (New Orleans, Louisiana). Contact American Mining Congress, Suite 300, 1920 N Street N.W., Washington, D.C. 20036, or facsimile 1-202-861-7535.

Sept. 23-28 ***ENC '90 Congress & Exhibition*** (Lyon, France) organized by the European Nuclear Society in collaboration with the ANS and Foratom. Contact Dr. P. Feuz, European Nuclear Society at 31-21 61 11.

Oct. 14-16 ***World Nuclear Fuel Market Annual Meeting*** (Toulouse, France). Contact Donna Cason at 1-404-447-1144.

Nov. 11-14 ***Nuclear Energy Forum*** (Washington Hilton, Washington, D.C.), sponsored by the USCEA and ANS. Contact the USCEA Conference Office at 1-202-293-0770, or the ANS Meetings Department at 1-312-352-6611.

Nov. 12-16 ***First Regional Seminar for Europe and the Middle East on Quality Management for Nuclear Power Projects*** (Prague, Czechoslovakia), sponsored by the International Atomic Energy Agency. Contact Conference Service Section, IAEA P.O. Box 100, A-1400 Vienna, Austria.

1991

April 14-18 ***Third International Conference on Nuclear Fuel Reprocessing & Waste Management*** (Sendai, Japan), sponsored by the Atomic Energy Society of Japan and the Japan Atomic Industrial Forum, co-sponsored by the American Nuclear Society and the European Nuclear Society. Contact the Japan Atomic Industrial Forum at telephone 3-508-2411, or facsimile 3-508-2094.

May ***Second International Conference on Transportation for the Nuclear Industry*** (Bournemouth, England). Contact the Conference Secretary, The Institution of Nuclear Engineers, at 081-698 1500.

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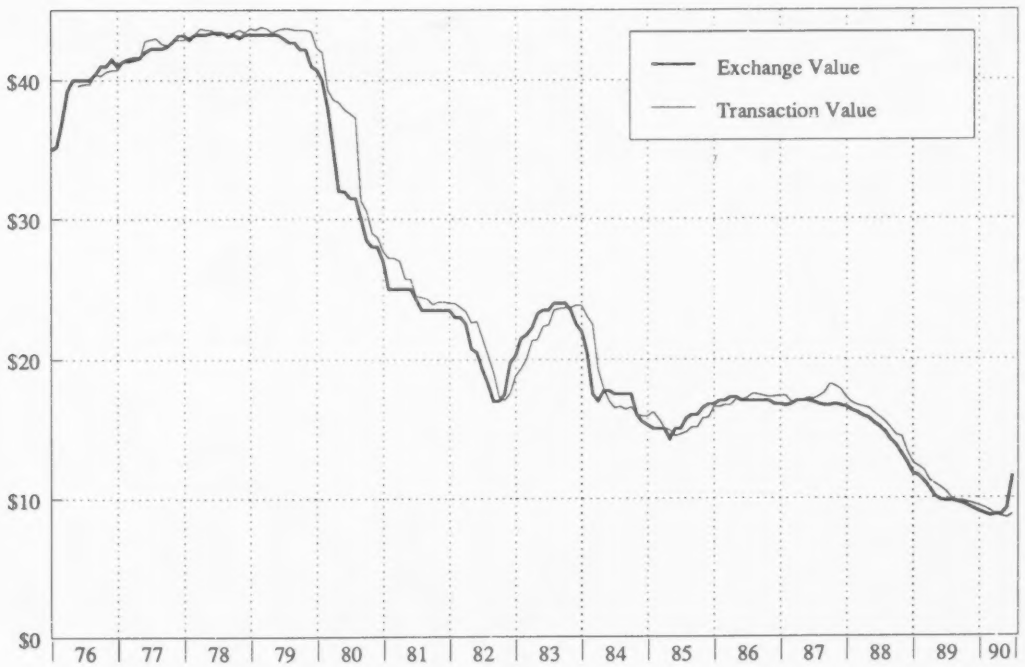
NUEXCO Historical Exchange Value and Transaction Value
(In US Dollars per Pound Equivalent U_3O_8)



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HISTORICAL MARKET DATA

HISTORICAL MARKET VALUES

EXCHANGE VALUES

Determined as of the last day of the month indicated ($US/lb U_3O_8)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1968	—	—	—	—	—	—	—	6.35	6.35	6.40	6.45	6.50
1969	—	6.35	6.10	6.10	6.25	6.25	6.20	6.20	6.15	6.15	6.15	6.20
1970	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.20	6.15	6.15	6.15	6.15
1971	6.20	6.20	6.20	6.20	6.15	6.05	6.00	5.95	5.95	5.95	5.95	5.95
1972	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95
1973	5.95	6.00	6.10	6.20	6.45	6.50	6.50	6.50	6.50	6.50	6.75	7.00
1974	7.70	7.90	8.00	9.00	9.50	10.50	11.50	12.00	12.50	14.00	14.75	15.00
1975	16.00	16.00	18.00	20.00	21.00	23.00	24.70	26.00	26.00	28.50	30.00	35.00
1976	35.20	37.00	39.25	40.00	40.00	40.00	40.00	40.40	41.00	41.00	41.50	41.00
1977	41.35	41.50	41.60	41.60	42.00	42.25	42.25	42.25	42.40	42.75	43.20	43.20
1978	42.90	43.25	43.25	43.25	43.40	43.40	43.40	43.10	43.25	43.00	43.25	43.25
1979	43.25	43.25	43.25	43.25	43.25	43.00	42.70	42.70	42.20	42.20	41.00	40.75
1980	40.00	38.00	35.00	32.00	32.00	31.50	31.50	30.00	28.50	28.00	28.00	27.00
1981	25.00	25.00	25.00	25.00	25.00	24.25	23.50	23.50	23.50	23.50	23.50	23.50
1982	23.00	23.00	22.50	20.75	20.50	19.25	18.25	17.00	17.00	17.50	19.75	20.25
1983	21.50	21.75	22.25	23.25	23.50	23.50	24.00	24.00	24.00	23.50	22.50	22.00
1984	20.50	17.50	17.00	17.75	17.75	17.50	17.50	17.50	17.50	16.00	15.50	15.25
1985	15.00	15.00	15.00	14.25	15.00	15.00	15.75	16.00	16.00	16.50	16.75	17.00
1986	17.00	17.00	17.25	17.25	17.00	17.00	17.00	17.00	17.00	17.00	16.75	16.75
1987	16.65	16.75	17.00	17.00	17.00	16.90	16.75	16.65	16.65	16.75	16.65	16.55
1988	16.30	16.15	15.90	15.75	15.40	15.10	14.75	14.15	13.75	13.15	12.50	11.75
1989	11.60	11.20	10.70	10.10	9.85	9.80	9.80	9.70	9.60	9.40	9.20	9.00
1990	8.85	8.70	8.80	8.80	9.25	**11.60**						

US PREMIUM (Relative to the Exchange Value)

Determined as of the last day of the month indicated ($US/lb U_3O_8)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1986	—	—	—	—	—	—	—	—	—	—	0.65	0.75
1987	0.85	1.00	1.50	1.50	0.90	0.60	2.50	2.35	2.10	1.65	0.85	0.65
1988	0.70	0.50	0.15	0.25	0.60	0.00	0.00	0.00	0.00	0.00	**Discontinued**	

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UF6 VALUES

Determined as of the last day of the month indicated ($US/kg U as UF_6)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1985	—	—	—	40.50	42.50	42.50	44.00	44.50	44.50	46.00	46.00	47.00
1986	47.00	48.00	48.00	48.50	48.25	48.25	48.25	48.00	48.00	48.00	48.00	47.75
1987	47.75	48.00	48.00	48.00	47.75	47.75	47.50	47.00	46.75	47.00	47.00	47.00
1988	46.50	46.00	45.50	45.25	44.75	44.00	42.75	41.00	40.75	39.00	37.50	35.50
1989	34.75	34.00	33.00	30.50	30.25	30.25	30.00	29.75	29.75	28.25	27.75	26.50
1990	25.90	25.25	24.40	24.40	25.50	**32.00**						

US UF6 PREMIUM (Relative to the UF6 Value)

Determined as of the last day of the month indicated ($US/kg U as UF_6)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1986	—	—	—	—	—	—	—	—	—	—	2.50	2.50
1987	2.50	2.50	3.50	3.00	2.25	1.75	6.50	6.00	4.25	3.10	2.25	2.00
1988	1.25	1.25	0.50	0.50	1.00	0.00	0.00	0.00	0.00	0.00	**Discontinued**	

TRANSACTION VALUES

Determined as of the last day of the month indicated ($US/lb U_3O_8)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1976	—	—	—	—	39.60	39.70	39.70	40.40	40.30	40.60	40.70	40.70
1977	41.30	41.30	41.40	41.50	42.80	42.90	43.00	42.60	42.50	42.80	42.90	42.90
1978	43.10	43.30	43.70	43.60	43.60	43.20	43.30	43.40	43.40	43.60	43.40	43.70
1979	43.60	43.80	43.70	43.40	43.60	43.70	43.70	43.60	43.60	43.60	43.50	42.30
1980	42.00	39.30	38.60	38.40	37.90	37.60	37.30	31.60	30.60	29.00	28.70	27.70
1981	27.20	27.20	27.00	25.70	25.70	24.50	24.40	24.30	23.90	24.10	24.10	24.00
1982	24.00	23.70	23.40	22.60	22.70	21.50	20.30	19.10	17.30	17.00	17.55	18.80
1983	19.35	20.00	21.35	21.40	22.35	22.45	23.50	23.60	23.65	23.65	23.85	23.85
1984	23.05	22.50	19.25	17.90	17.00	16.50	16.60	16.40	16.55	16.05	15.90	15.90
1985	16.20	15.70	15.05	14.90	14.45	14.60	14.75	15.10	15.10	15.75	15.80	16.55
1986	16.55	16.70	16.70	17.10	17.15	17.20	17.50	17.45	17.35	17.25	17.30	17.35
1987	17.35	16.90	16.95	17.00	17.20	17.10	17.30	17.55	18.20	18.05	17.80	17.20
1988	16.85	16.65	16.55	16.45	16.10	15.80	15.45	15.00	14.50	14.40	13.30	12.50
1989	12.25	12.00	11.25	11.00	10.75	10.45	9.95	9.80	9.80	9.65	9.55	9.40
1990	9.25	9.05	8.75	8.65	8.55	**8.80**						

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HISTORICAL MARKET DATA

LOAN RATES

Determined as of the last day of the month indicated (Percent per Annum)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1968	—	—	—	—	—	—	—	4.00	4.00	4.00	4.00	4.00
1969	4.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00	6.00	6.00	6.00	6.00
1970	6.00	6.20	6.40	6.50	6.50	6.50	6.50	5.00	6.50	6.00	5.50	5.50
1971	5.00	4.75	4.75	4.75	5.00	5.25	5.25	5.25	5.25	5.25	4.50	4.50
1972	4.00	4.00	4.00	4.50	4.50	4.50	5.00	5.00	5.00	5.00	5.00	5.00
1973	5.50	5.50	5.75	5.75	6.00	6.25	7.00	7.00	7.00	7.00	7.50	8.00
1974	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
1975	8.00	7.00	7.00	7.00	7.00	6.50	6.50	6.50	6.50	6.50	6.50	6.50
1976	6.50	6.50	6.50	6.50	*	*	*	*	*	*	*	*
1977	*	*	*	*	6.50	6.50	6.50	6.75	7.25	7.25	7.25	7.25
1978	7.25	7.00	7.00	7.00	7.00	7.50	7.75	7.75	7.75	7.00	7.00	7.00
1979	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
1980	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
1981	7.00	7.00	7.00	7.00	7.00	5.50	5.50	5.50	5.50	6.00	6.00	6.00
1982	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
1983	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
1984	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
1985	6.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
1986	5.00	5.00	5.00	5.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
1987	3.00	3.00	3.00	3.00	3.00	3.00	3.00	4.00	4.00	4.00	3.50	3.50
1988	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1989	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1990	3.50	3.50	3.50	3.50	3.50	**3.50**						

* Float with Prime Rate

CONVERSION VALUES

Determined as of the last day of the month indicated ($US/lb U as UF_6)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1981	1.20	1.20	1.20	1.40	1.15	1.15	1.15	1.10	1.10	1.10	1.20	1.20
1982	1.20	1.20	1.20	1.20	1.00	1.00	1.00	0.90	1.10	1.60	1.45	1.45
1983	1.20	1.40	1.40	1.20	1.20	1.20	1.10	1.10	1.00	0.60	0.60	0.60
1984	0.60	0.30	0.80	0.80	0.80	0.00	0.00	0.80	1.00	1.00	0.80	0.80
1985	1.00	1.00	1.00	1.50	1.50	1.60	1.60	1.60	1.60	1.60	1.60	1.60
1986	1.60	1.80	1.90	1.80	1.80	1.80	1.80	1.90	1.90	1.90	1.80	1.80
1987	1.80	1.80	1.80	1.80	1.80	1.80	1.90	1.90	1.90	1.90	1.90	1.90
1988	1.90	1.80	1.80	1.80	1.80	1.80	1.85	1.95	1.95	1.95	1.95	1.95
1989	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.90	1.90	1.80	1.75	1.65
1990	1.50	1.50	1.45	1.45	1.45	**1.45**						

SWU VALUES

Determined as of the last day of the month indicated ($US per SWU)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1986	80	80	80	80	75	78	78	78	78	78	80	80
1987	80	80	77	77	75	73	75	75	73	69	73	73
1988	73	73	70	68	68	68	68	65	65	65	65	65
1989	65	67	67	67	66	66	66	65	63	59	57	54
1990	54	50	50	50	50	**50**						

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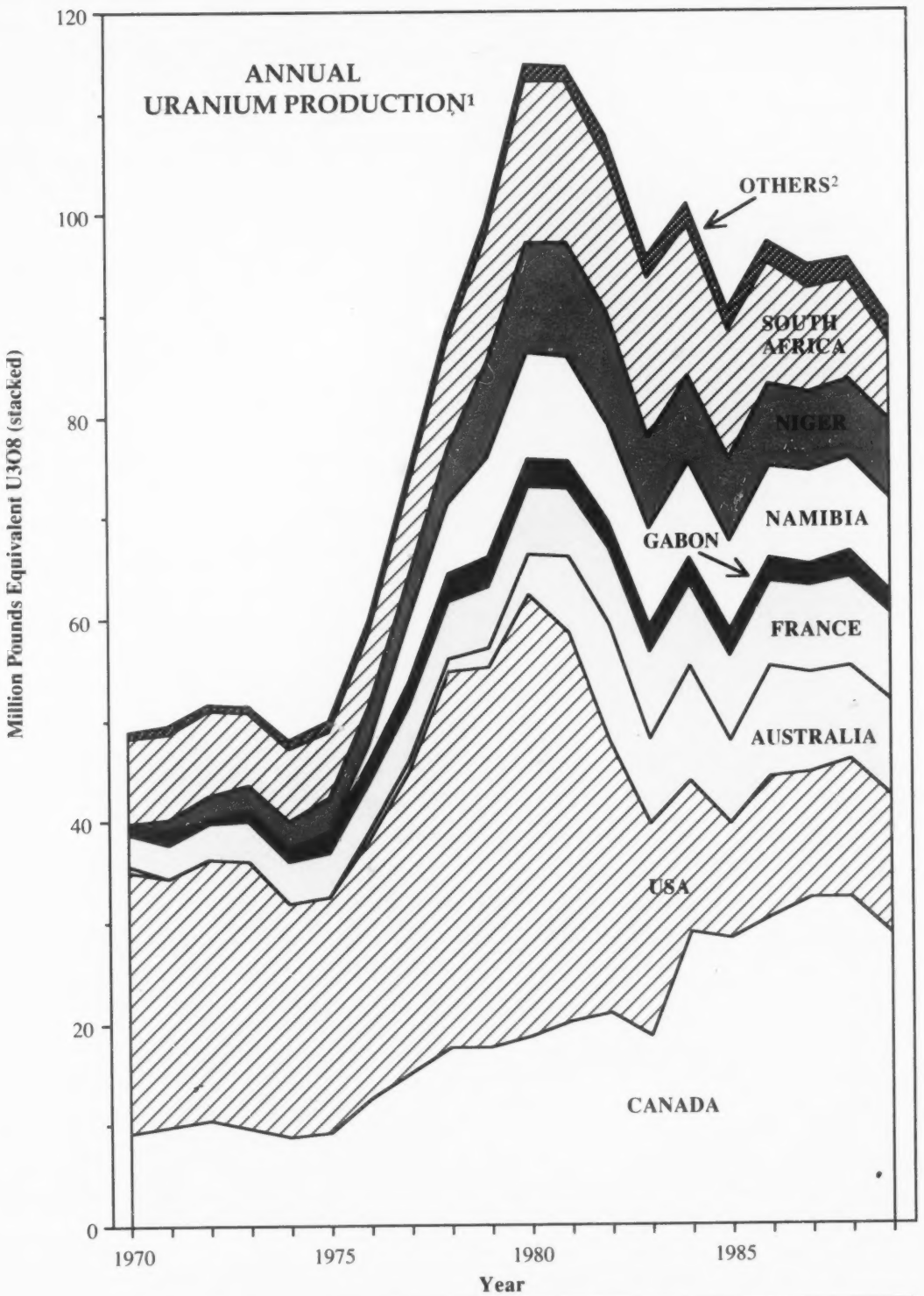

[1] Estimated world production in 1989 totalled 89.6 million pounds (Australia—9.5; Canada—28.7; France—8.5; Gabon—2.2; Namibia—9.2; Niger—7.7; South Africa—7.7; USA—13.7; Others[2]—2.3).

[2] **Others** includes: Argentina, Belgium, Brazil, India, Pakistan, Portugal, Spain, West Germany and Yugoslavia

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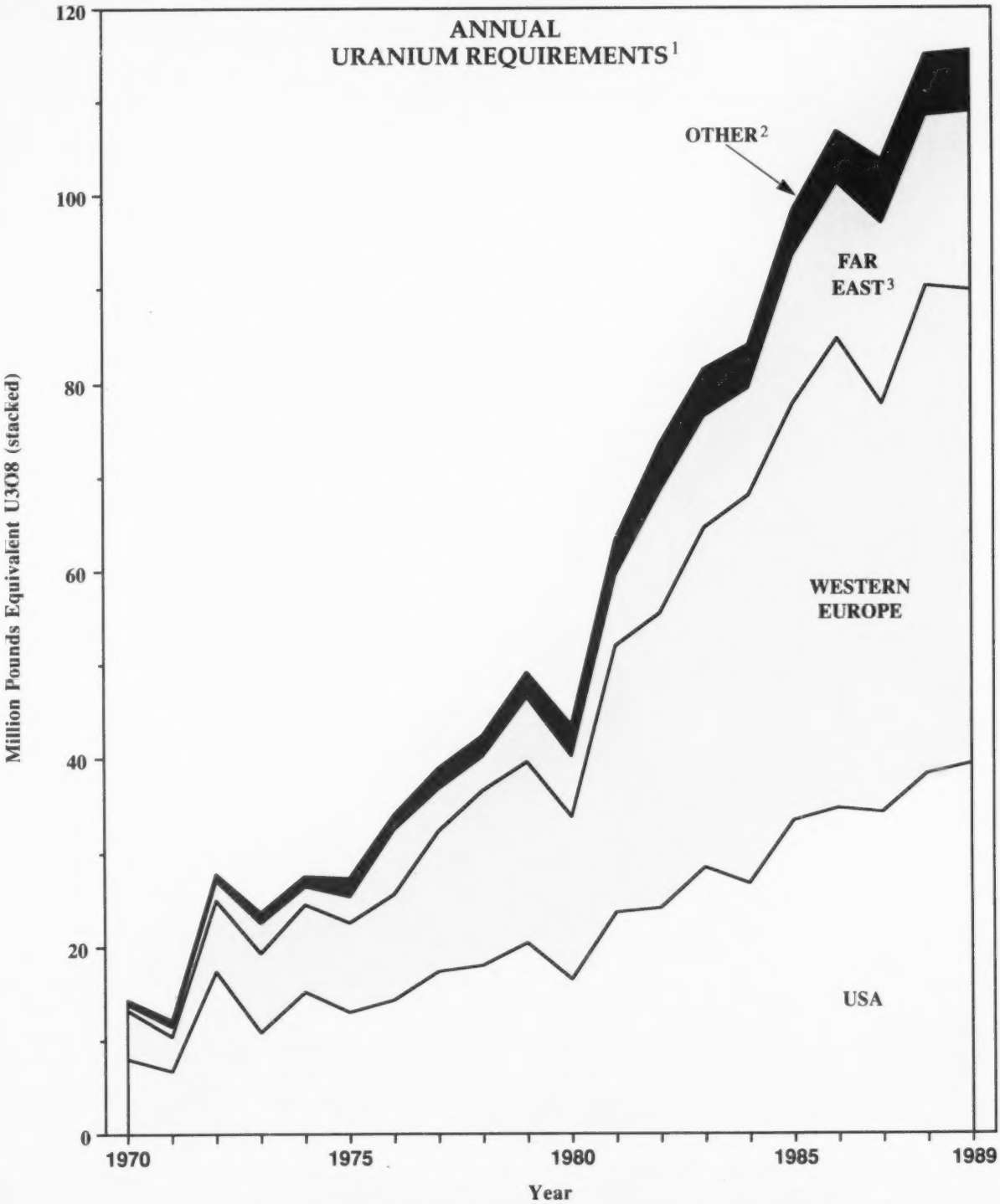
HISTORICAL MARKET DATA



[1] Calculated by NUEXCO based on actual completion dates and operating performance, and NUEXCO's estimate of enriching tails assays.

[2] **Other** include: Argentina, Brazil, Canada, India, Mexico, Pakistan and South Africa.

[3] Does not include Peoples Republic of China.

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AUSTRALIA

Year	Period [1]	Consumer Price Index [2] (1980/1981 = 100)	Price Index of Materials Used in Manufacturing Industry — All Groups [3] (1984/1985 = 100)	Average Weekly Ordinary Time Earnings — Adult Males — Australia [4] (Australian dollars)	Award Rates of Pay Indexes Australia - Adult Males In Mining Wage Earners, Weekly Rates [5] (June 1985=100)
1980	Avg.	95.8	83.1	—	140.8[6]
1981	Avg.	105.0	85.9	—	154.1[6]
1982	Avg.	116.7	89.0	—	174.9[6]
1983	Avg.	128.5	96.9	—	181.9[6]
1984	Avg.	133.6	98.0	—	194.4[6]
1985	Avg.	142.6	107.3	—	103.7
1986	Avg.	155.5	101.5	—	106.1
1987	Avg.	168.7	108.9	465.88	112.3
1988	Avg.	180.9	111.8	496.90	115.2
1989	Avg.	194.6	117.0	534.65	—
Jan	1989	—	110.6	—	122.2
Feb	1989	—	111.2	521.90	122.2
Mar	1989	188.0	114.9	—	123.1
Apr	1989	—	117.5	—	125.4R
May	1989	—	118.6	530.40	125.6R
June	1989	192.6	119.9	—	125.8R
July	1989	—	120.1	—	126.9R
Aug	1989	—	119.2	539.30	127.0R
Sept	1989	197.0	117.7	—	127.1R
Oct	1989	—	117.8	—	127.3R
Nov	1989	—	118.0	547.00R	127.6R
Dec	1989	200.7	118.2	—	128.0R
Jan	1990	—	119.2	—	128.0R
Feb	1990	—	120.8	—	128.0R
Mar	1990	204.1	121.5	—	128.2
Apr	1990	—	119.9	—	128.5

P = Preliminary **R** = Revised since last month

[1] Monthly data for the period 1967 to 1986 appears in Report 233 (January 1988).
[2] Weighted average of six State capital cities (1975 to 1980), and eight capital cities from 1981 (Base: Financial year July 1980 to June 1981 =100.0). Figures shown at end of quarter represent quarterly average.
[3] Australian Bureau of Statistics, Canberra: "Price Index of Materials Used in Manufacturing Industry" (Catalogue No. 6411.0).
[4] Australian Bureau of Statistics, Canberra: "Award Rates of Pay Indexes, Australia" (Catalogue No. 6312.0). Figures for the latest fourteen months shown are subject to revision.
[5] Australian Bureau of Statistics, Canberra: "Average Weekly Earnings, States & Australia" (Catalogue No. 6302.0).
[6] Base: June 1976 = 100.

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GOVERNMENT STATISTICS

CANADA

		Industrial Products Price Index: All Commodities[1] (1981 = 100)	Consumer Price Index: All Items (1981 = 100)	Wage-earner Data: Average Hourly Earnings (C$)[2]				
				Uranium Mines (SIC 057)	Metal Mines (SIC 051-059)	Mines, Quarries and Oil Wells[3] (SIC 051-099)	Metal Rolling, Casting and Extruding (SIC 298)	Chemicals and Chemical Products Industries (SIC 372-379)
1980	Avg.	90.7	88.9	—	—	—	—	—
1981	Avg.	100.0	100.0	—	—	—	—	—
1982	Avg.	106.7	110.8	—	—	—	—	—
1983	Avg.	110.4	117.2	17.22	—	14.18	10.67	11.10
1984	Avg.	115.4	122.3	17.89	—	14.97	11.11	11.68
1985	Avg.	118.6	127.2	18.53	16.48	15.56	11.85	12.12
1986	Avg.	119.6	132.4	19.38	16.70	15.76	12.28	12.58
1987	Avg.	122.7	138.2	20.12	17.15	16.11	12.58	13.20
1988	Avg.	128.1	143.8	20.91	18.51	16.95	13.17	13.77
1989	Avg.	131.1R	151.0	21.97	20.02	18.41	13.71	14.16
Jan	1989	130.7	146.8	21.22	19.45	18.14	13.75	13.82
Feb	1989	130.8	147.8	22.05	19.51	18.26	13.79	13.89
Mar	1989	131.3	148.5	21.90	19.65	18.35	13.62	14.10
Apr	1989	131.3	149.0	22.37	19.80	18.40	13.57	14.16
May	1989	131.4	150.5	21.89	20.02	18.17	13.76	14.27
June	1989	131.5	151.3	21.89	20.02	18.17	13.76	13.22
July	1989	131.4	152.3	21.67	19.60	17.96	13.57	12.98
Aug	1989	131.3	152.4	20.97	19.76	18.24	13.52	14.30
Sept	1989	131.0	152.6	21.97	20.61	18.73	13.68	14.83
Oct	1989	130.8	153.2	22.26	20.71	18.74	13.99	14.77
Nov	1989	130.8R	153.7	22.60	20.64	18.78	13.93	14.75
Dec	1989	130.4R	153.6	22.80	20.50	18.93	13.62	14.77
Jan	1990	130.7R	154.9	21.88	20.39	19.03	13.99	14.78
Feb	1990	131.6R	155.8	22.51	20.63	19.14	14.49	15.03
Mar	1990	131.4R	156.3	22.52	20.75R	19.17	14.99R	15.07R
Apr	1990	131.4	156.4	23.15P	20.81P	19.28P	14.71P	14.99P
May	1990	131.8	157.2	—	—	—	—	—

P = Preliminary **R** = Revised since last month

[1]Statistics Canada, Prices Division, Ottawa: "Industry Price Indexes" (Catalogue 62-011). Indexes for the most recent six months shown are subject to revision. This category was formerly known as "Manufacturing." Monthly data for the period 1967 to 1986 is found in Report 233.
[2]Statistics Canada, Labour Division, Employment and Payrolls Section, Ottawa: "Employment, Earnings and Hours." Monthly data for the period 1983 to 1986 is found in Report 233.
[3]Reports 175 through 185 list this series title incorrectly as "Metal Mining, Including Milling (SIC 050-099)."

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SOUTH AFRICA

		Average Declared Working Costs per Metric Ton of Gold Ore Milled [1] (Rand)	Tonnage-Weighted Index of Average Working Costs per Metric Ton of Gold Ore Milled [2] (March 1982 = 100)	Consumer Price Index [3] (1985 = 100)	Production Price Index All Groups [4] (1985 = 100)	Total Employment in Mining and Quarrying [5]	Total Salaries and Wages in Mining and Quarrying [5] (1,000 Rand)
							Annual Total [6]
1980	Avg.	35.53	—	51.9	55.2	709,042	2,237,689
1981	Avg.	41.89	—	59.8	62.7	722,918	2,756,928
1982	Avg.	47.25	104.2	68.6	71.4	702,041	3,181,584
1983	Avg.	51.88	115.0	77.1	79.0	700,901	3,563,282
1984	Avg.	58.95	130.3	86.0	85.6	711,511	4,134,390
1985	Avg.	68.76	151.6	100.0	100.0	724,587	4,778,612
1986	Avg.	80.22	177.9	118.6	119.5	756,637	5,767,950
1987	Avg.	95.01	223.1	137.7	136.2	751,864	6,911,395
1988	Avg.	106.69	241.1	155.4	154.1	705,355	7,774,054
1989	Avg.	116.65	273.0	178.2	177.5	700,360	8,833,934R
							Monthly Total
Jan	1989	—	—	166.8	165.5	714,593	704,320
Feb	1989	—	—	168.2	168.5	696,329	669,983
Mar	1989	112.29	262.8	170.9	171.1	702,746	695,843
Apr	1989	—	—	173.1	173.8	658,677	634,344
May	1989	—	—	175.9	176.4	706,056	721,263
June	1989	113.76	267.0	177.7	177.1	706,810	720,586
July	1989	—	—	179.3	178.8	711,648	775,002
Aug	1989	—	—	181.8	180.7	703,812	793,475
Sept	1989	119.76	280.2	183.4	181.7	708,222	780,723
Oct	1989	—	—	185.1	183.9	689,017	737,718R
Nov	1989	—	—	187.0	185.6	704,025	790,375
Dec	1989	120.79	282.0	189.4	187.2	702,332	810,302
Jan	1990	—	—	192.0	188.8	688,837	801,616
Feb	1990	—	—	193.3	190.3	674,026	767,274
Mar	1990	126.74	296.3	196.4	190.9	—	—
Apr	1990	—	—	198.3	194.0	—	—
May	1990	—	—	200.4	—	—	—

P = Preliminary **R** = Revised since last month

[1] Chamber of Mines of South Africa, Johannesburg: "Analysis of Working Results," published quarterly. Historical Data by month appears in Report 236.

[2] Page 16 of Report 178 contains description and calculation of index, and page 24 of Report 178 lists figures for 1982.

[3] Central Statistical Service, Pretoria: All income groups-weighted average, Historical Data by month appears in Report 236.

[4] Central Statistical Service, Pretoria: All commodities for consumption in South Africa.

[5] Central Statistical Service, Pretoria: Historical Data by month appears in Report 236.

[6] Annual total is shown, rather than monthly average for indicated year.

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GOVERNMENT STATISTICS

UNITED STATES

		Producer Price Index[1]		Consumer Price Index[2]	GNP Implicit Price Deflator[3]	Gross Average Hourly Earnings of Production or Non-supervisory Workers (US$)[4]			
		Industrial Commodities (1982 = 100)	All Commodities (1982 = 100)	(1982-1984 = 100)	(1982 = 100)	Metal Mining (SIC 10)	Primary Non-ferrous Metals (SIC 333)	Chemicals and Allied Products (SIC 28)	Electric and Electronic Equipment (SIC 36)
1980	Avg.	88.0	89.8	82.4	85.7	10.26	10.63	8.30	6.94
1981	Avg.	97.4	98.0	90.9	94.0	11.55	11.98	9.12	7.62
1982	Avg.	100.0	100.0	96.5	100.0	12.31	12.93	9.96	8.21
1983	Avg.	101.1	101.3	99.6	103.9	12.58	13.43	10.58	8.67
1984	Avg.	103.3	103.7	103.9	107.7	13.05	13.43	11.07	9.04
1985	Avg.	103.7	103.2	107.6	110.9	13.38	13.74	11.56	9.46
1986	Avg.	100.0	100.2	109.6	113.9	12.46	13.48	11.98	9.65
1987	Avg.	102.6	102.8	113.6	117.7	12.52	12.98	12.37	9.88
1988	Avg.	106.3	106.9	118.3	121.7	13.09	13.22	12.67	10.13
1989	Avg.	111.6	112.2	124.0	126.6	13.67	13.75	13.06	10.38
Jan	1989	109.4	110.5	121.1	—	13.80	13.49	12.85	10.27
Feb	1989	110.1	110.8	121.6	—	13.66	13.48	12.88	10.26
Mar	1989	110.5	111.5	122.3	125.4	13.71	13.51	12.91	10.30
Apr	1989	111.8	112.3	123.1	—	13.68	13.65	12.92	10.31
May	1989	112.1	113.2	123.8	—	13.60	13.57	12.98	10.33
June	1989	112.4	112.9	124.1	126.0	13.62	13.66	12.98	10.37
July	1989	112.2	112.8	124.4	—	13.70	13.75	13.12	10.41
Aug	1989	111.4	112.0	124.6	—	13.64	13.72	13.08	10.40
Sept	1989	111.9	112.4	125.0	126.8	13.70	13.99	13.18	10.47
Oct	1989	112.4	112.8	125.6	—	13.76	13.94	13.25	10.43
Nov	1989	112.2	112.7	125.9	—	13.69	14.12	13.26	10.47
Dec	1989	112.3	113.0	126.1	128.0	13.51	14.16	13.31	10.52
Jan	1990	114.1R	114.9	127.4	—	13.75	13.95	13.31	10.50
Feb	1990	113.6	114.4	128.0	—	13.75	13.98	13.24	10.54
Mar	1990	113.2	114.2	128.7	129.7	13.85R	14.04R	13.30R	10.58
Apr	1990	113.1	114.0	128.9	—	14.06P	14.33P	13.45R	10.58
May	1990	113.3	114.5	129.2	—	—	—	13.45P	10.67P

P = Preliminary **R** = Revised since last month

[1]US Bureau of Labor Statistics, Washington, D.C.: "Producer Prices and Price Indexes," (formerly "Wholesale Prices and Price Indexes"). Producer Price Indexes are revised four months after they are first released to reflect the availability of late reports and corrections by respondents. Historical data is presented in Report 233.

[2]US Bureau of Labor Statistics, Washington, D.C.: Consumer Price Index for All Urban Consumers, US City Average, All Items. Historical data is presented in Report 233.

[3]US Department of Commerce, Washington, D.C.: Bureau of Economic Analysis, National Income and Wealth Division: "Survey of Current Business." The GNP Implicit Price Deflator is published quarterly, and seasonally adjusted. Historical data is presented in Report 233.

[4]US Bureau of Labor Statistics, Washington, D.C.: "Employment and Earnings." All data based on 1972 revision of SIC Manual. Historical data is presented in Report 233.

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VOLUME AND PRICE OF URANIUM DELIVERIES TO THE EUROPEAN COMMUNITY [1]
(Compiled from data published by the Euratom Supply Agency)

Year	Volume of Deliveries to the EC [2] (MTU)	Percentage of Deliveries Made Under Spot Contracts	Medium or Long-Term Contracts [3] Average Price		Spot Contracts [3] Average Price	
			in ECU per pound U_3O_8	in US Dollars per pound U_3O_8	in ECU per pound U_3O_8	in US Dollars per pound U_3O_8
1977	n/a	n/a	n/a	n/a	n/a	$41.00
1978	n/a	n/a	n/a	n/a	n/a	$43.00
1979	10,000	n/a	n/a	n/a	n/a	$44.50
1980	8,600	n/a	n/a	$36.00	n/a	$35.00
1981	13,000	less than 10	n/a	$33.25	n/a	$28.00
1982	12,500	less than 10	ECU 32.25	$32.00	ECU 24.25	$24.00
1983	13,500	less than 10	ECU 34.75	$31.00	ECU 26.00	$23.25
1984	11,000	less than 10	ECU 37.75	$29.75	ECU 24.50	$19.25
1985	11,000	11.5	ECU 38.00	$29.00	ECU 19.50	$15.00
1986	12,000	9.5	ECU 31.50	$31.00	ECU 18.00	$17.75
1987	14,000	17.0	ECU 28.25	$32.50	ECU 15.00	$17.25
1988	12,500	4.5	ECU 26.92	$31.82	ECU 13.65	$16.13
1989	13,500	11.5	ECU 26.63	$29.35	ECU 11.04	$12.19

R = Revised

[1] The twelve European Community member nations are Belgium, Denmark, France, West Germany, Greece, Ireland, Italy, Luxembourg, The Netherlands, Portugal, Spain, and the United Kingdom; prior to January 1986, Spain and Portugal were not members of the EEC.

[2] The only deliveries taken into account are those made to final users, namely the electric utilities or their procurement organizations; deliveries to middlemen or fuel cycle companies are not included. The sales between utilities in the Community are also excluded. The quantities covered are those which were entered into accounting records during the year stated.

[3] For deliveries made under medium or long-term contracts (i.e., for which the time between the date of signature and the date of the last delivery exceeds one year) the prices were expressed in seven different currencies. In order to calculate an average price, these prices have been converted into European Currency Units (ECU) and US dollars. The average prices were weighted by quantity and converted on the basis of the average annual exchange rate of the different currencies against the ECU and US dollar. Exchange rates are published by European Communities Statistical Office and the International Monetary Fund.

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GOVERNMENT STATISTICS

US URANIUM MARKETING ACTIVITIES STATISTICS
(Compiled from data published by the US Energy Information Administration) [1]

Year	Total Production (million pounds U_3O_8)	Deliveries to Domestic Utilities From US Suppliers[2] (million pounds U_3O_8)	Average Price of Delivered Uranium[2] ($/lb. U_3O_8)	Quantity of Uranium Imported[3] (million pounds U_3O_8)	Average Price of Imported Uranium ($/lb. U_3O_8)	Quantity of Uranium Exported (million pounds U_3O_8)
1976	25.5	27.6	$16.10	3.6	n/a	1.2
1977	29.9	27.8	$19.75	5.6	n/a	4.0
1978	37.0	31.6	$21.60	5.2	n/a	6.8
1979	37.5	33.0	$23.85	3.0	n/a	6.2
1980	43.7	35.0	$28.15	3.6	$43.10	5.8
1981	38.5	32.6	$34.65	6.6	$32.90	4.4
1982	26.9	23.5	$38.37	17.1	$25.19	6.2
1983	21.2	24.2	$38.21	8.2	$26.16	3.3
1984	14.9	22.5	$32.65	12.5	$21.86	2.2
1985	11.3	21.7	$31.43	11.7	$20.08	5.3
1986	13.5	18.9	$30.01	13.5	$20.07	1.6
1987	13.0	20.8	$27.37	14.8	$19.14	1.0
1988	13.1	17.6	$25.65	15.8	$19.03	3.3

[1] Sources: 1976-1983: US Department of Energy/Energy Information Administration, *Survey of United States Marketing Activity*
1984-1988: Energy Information Administration, *Uranium Industry Annual*
[2] Data for 1976-1981 includes both domestic utilities and agents
[3] Includes imports by domestic utilities and domestic suppliers

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